PHILOSOPHY, RELIGION AND EDUCATION

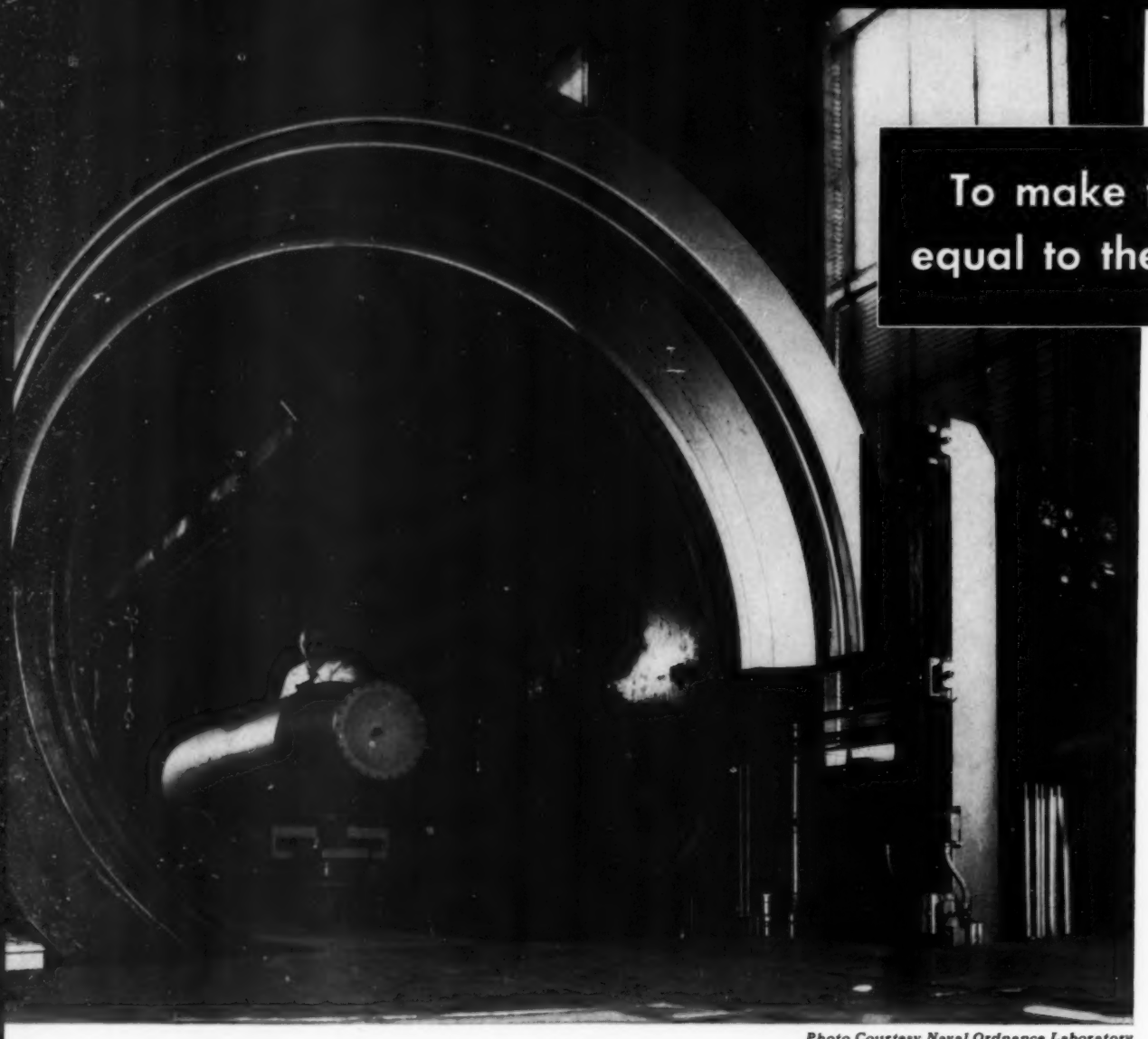
Industrial Arts and Vocational Education

DETROIT

PROFESSIONAL MAGAZINE

September, 1952 Vol. 41, No. 7

SCHOOL OPENING NUMBER



To make them equal to the need

Photo Courtesy Naval Ordnance Laboratory

The nation now faces great needs. One need is to equate its defense mechanisms to the demands of the perilous times that lie ahead. In order to do this, Defense Departments are building "simulators." For example the Naval Ordnance Laboratory has built at White Oak a huge deep-sea pressure tank. Here, designs of submarine craft and underwater mines are tested in water pressures encountered as far down as a half mile below the ocean's surface. Thus, designs in process can be modified, changed and perfected before these designs are released for final construction and use.

Another need of the nation is to equate the men-to-be now in our schools to the responsibilities they will face when they emerge into adult life. But here, as wise educators know, more than the mere simulation of job requirements is needed. These educators know the need for positive and creative simulation so that the structure of a youngster's integrity will stand up under the buffeting of the merely expedient and corrupt . . . so that he will espouse the right standards . . . and acquire the habit of mobilizing all his energy toward a goal and then of "pouring it on."

And because these traits develop slowly and by example and practice, the wise educator finds their substance and prototype in the work in school and in his own attitude. Instructors in mechanical drafting know it is a matter of developing among other things a practiced sense of distinguishing between the good and the shoddy, the fine and the mediocre. And because a student can give back only what he is accustomed to, such instructors seek to inspire a love for the good and the fine in the student and consistently to expect such work in return. Nor do they permit all they are seeking to do to be contradicted and cancelled out by the final inconsistency of drawing instruments carelessly made and carelessly chosen. They insist that these possessions be *proud* possessions, the best the student can afford.

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Film No. II Teaches all basic operations in between centers machining. Shows use of calipers and micrometers, drilling center holes, selecting cutter bits, facing, rough and finish turning. Time, 20 min. 16 mm sound, full color. *Free loan.*

"GRINDING and USE of BASIC LATHE TOOL CUTTER BITS"
Film No. III Shows grinding of cutter bits for rough and finish turning, cutting off, thread cutting. Also, tool adjustment and action. Time, 20 minutes. 16 mm sound, full color. *Free loan.*

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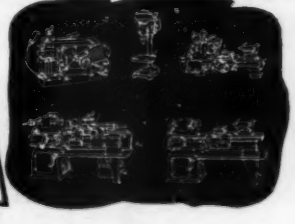

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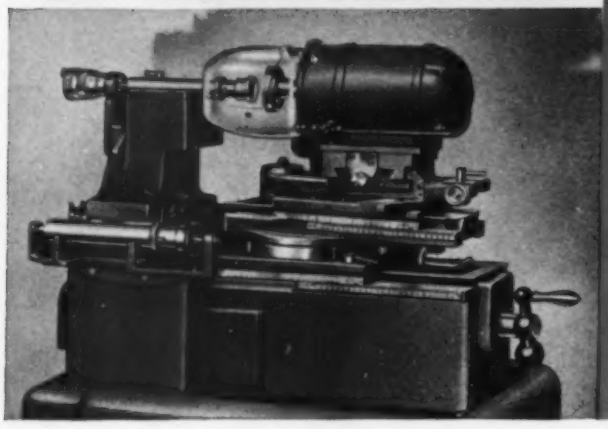

REMOVING BURS (above) from brass lens-coating plate. The right file for use on this ductile metal is the Nicholson Brass File (illustrated). Its short upcut angle prevents file from running off the work. Its long overcut produces many tooth points on the upcut to break up filings; also allows file to clear itself of chips.

LATHE FILING (upper left) cast-iron housing part of Micro-Surfacer. The right file for smoothing work spun on a lathe is the Nicholson Long Angle Lathe File (illustrated). Long angle of its single-cut teeth slides chips down and out, minimizing chances of filling up and of scratching metal being filed.

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Vol. 41 No. 7

SEPTEMBER, 1952

INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

THE SHOP TEACHERS' PROFESSIONAL MAGAZINE

Published on the 15th of month preceding date of issue

THE BRUCE PUBLISHING COMPANY,
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• CENTRAL OFFICE: 20 North Wacker Drive, Chicago 6, Ill. • EASTERN OFFICE: 225 Broadway, New York 7, N. Y.

★ ★ ★ ★

This Month's Cover

The cover picture of the 1952 School Opening Number of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION shows how hand finishing on a multiple cavity plastic molding die is done at the Milwaukee Vocational and Adult Education School.

By learning how to do work such as this, the student discovers what tool- and diemakers have to do on the job. This acquaintance with the work of the mechanic will help the beginner overcome the fear which naturally assails him when he enters his first job in an industrial shop.

Instructor of the tool and die making course at the above school is Matthew J. Pachi.

★ ★ ★ ★

Entered January 2, 1914, as Second-Class Mail Matter at Milwaukee, Wis., under Act of March 3, 1879. Copyright, 1952, by the Bruce Publishing Co. Title registered as Trade Mark in U. S. Patent Office, November 25, 1930. Published monthly except during July and August.

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Articles Indexed. — The articles contained in the Magazine are regularly indexed in "The Readers' Guide to Periodical Literature," and "Education Index."

TABLE OF CONTENTS

The School and Public Relations.....*Robert W. Tarbell* 207
Preparing and Using Lesson Plans.....*H. Robert Kinker* 209
Four-Year College Mechanic Arts Curriculum .....*O. A. Hankammer* and *Jack W. Morgan* 215
Training High School Drawing Teachers.....*Earl L. Bedell* 216
Leaders in Industrial Education.....*William T. Bawden* 218
Professional Organization Field Chapter Activities.....*Fred Baer* 221
Editorials 223
Techniques of Preparing, Giving, and Scoring a Written Trade Test .....*J. Douglas Wilson* 224
Public Relations..... 226

PROBLEMS AND PROJECTS

Corner Cupboard.....*Harold O. Akeson* 227
Plastic Candleholders.....*Robert E. Bergstrom* 228
Modern Swedish Coffee Table.....*V. E. Broadbent* 229
An Inexpensive Method for Reducing Drawings to Notebook Size .....*John Emmel* 230
Community Contribution.....*D. C. Shirk* 230
Teaching-Learning Device for Mechanical Drawing...*Franklin P. Morley* 233
An Ideal Lapidary Shop.....*Francis J. Sperisen* 234
Hobbyhorse.....*Jerome Leavitt* 238
Handy Glue Spreader..... 239
Press Mold — A Good Ceramic Project.....*Vernon D. Seeley* 239
Blond Hope Chest.....*Louis Barocci* 241
Candy Dish.....*James E. Seitz* 242
Safety Drill and Reamer Holder.....*Warren D. Conrad* 242
Universal Mandrel.....*Walter O. Hayes* 243
Crosscutting Fence for Variety Saw.....*Paul E. Powell* 246
Board Measure Chart.....*Troy C. Bond* 246
Teaching Materials for Industrial Education.....*Chris H. Groneman* 248
Chemistry Involved in Soldering.....*Anthony Lanfri* 44A
Sunburns in Industry.....*W. Schweisheimer* 49A

Association News..... 4A
New Publications..... 27A
Personal News..... 32A
News Notes..... 43A
Shop Equipment News..... 52A

ASSOCIATION NEWS

COMING CONVENTIONS

Oct. 3–4. Ohio Vocational Association, at Southern Hotel, Columbus, Ohio. Secretary: Ralph Woodin, Ohio State University, Columbus, Ohio.

Oct. 16–18. Maryland Industrial Education Division of MSTA, at Lord Baltimore Hotel, Baltimore, Md. (With Maryland State Teachers Association.) Secretary: Milton C. Raver, 1101 N. Calvert St., Baltimore, Md.

Oct. 16–19. Maryland Vocational Association, at Lord Baltimore Hotel, Baltimore, Md. Secretary: Anna R. Macks, Baltimore County Department of Education, Towson, Md.

Oct. 23–24. Minnesota Industrial Arts Association, at Municipal Auditorium, St. Paul, Minn.

Oct. 30. Rhode Island Vocational and Industrial Arts Association, at 205 Beriefel St., Providence, R. I. Secretary: Richard Durham, 393 Power Rd., Pawtucket, R. I.

Resolution presented and unanimously adopted at the meeting of the National Association of State Directors for Vocational Education held at Washington, D. C., on Tuesday, May 6, 1952.

WHEREAS, Commissioner of Education, Earl J. McGrath has used the most democratic procedure of administration by co-operating with the National Association of State Directors for Vocational Education in studying the current problems of vocational education, and

WHEREAS, Constructive action has been taken by Commissioner McGrath in laying the foundation for further development of vocational education in the United States, and

WHEREAS, Further study and further action is contemplated,

Be it resolved, That the National Association of State Directors for Vocational Education, assembled in the Statler Hotel, Washington, D. C., on Tuesday, May 6, 1952, does hereby express its sincere appreciation for and great interest in his most courageous position of professional leadership in the field of vocational education and the above named Association furthermore pledges its continued support and extends to him its services and experience at his convenience, to be used in any way toward the further development of vocational education, through the public schools, for defense, as well as civilian purposes.

We furthermore wish to make known that the above named Association has complete confidence in the leadership and professional judgment of the United States Commissioner of Education, Earl J. McGrath.

NEW YORK STATE VOCATIONAL AND PRACTICAL ARTS ASSOCIATION CONVENTION

The New York State Vocational and Practical Arts Association meeting was held in Syracuse, N. Y., April 3 to 5, 1952.

The meeting was highlighted by speeches by Dr. L. A. Wilson, commissioner of education, Hon. Irving M. Ives, senator from New York and former director of School of Labor Relations at Cornell University, and Dr. Harry S. Ganders, dean of Graduate School, Syracuse University.

Dr. Lynn Emerson, professor of industrial education at Cornell University, received a meritorious service award which was presented by Horace Griffith, assistant superintendent of schools, and director of vocational education, Utica, N. Y.

The newly elected officers are: MAXIMILIAN KOMOW, Brooklyn, president; JOSEPH C. DELUHERY, Buffalo, general vice-president; WILLIAM E. MALE, Gloversville, treasurer; BLANCHE

(Continued on page 6A)

THE NEW STARRETT TOOL CHART

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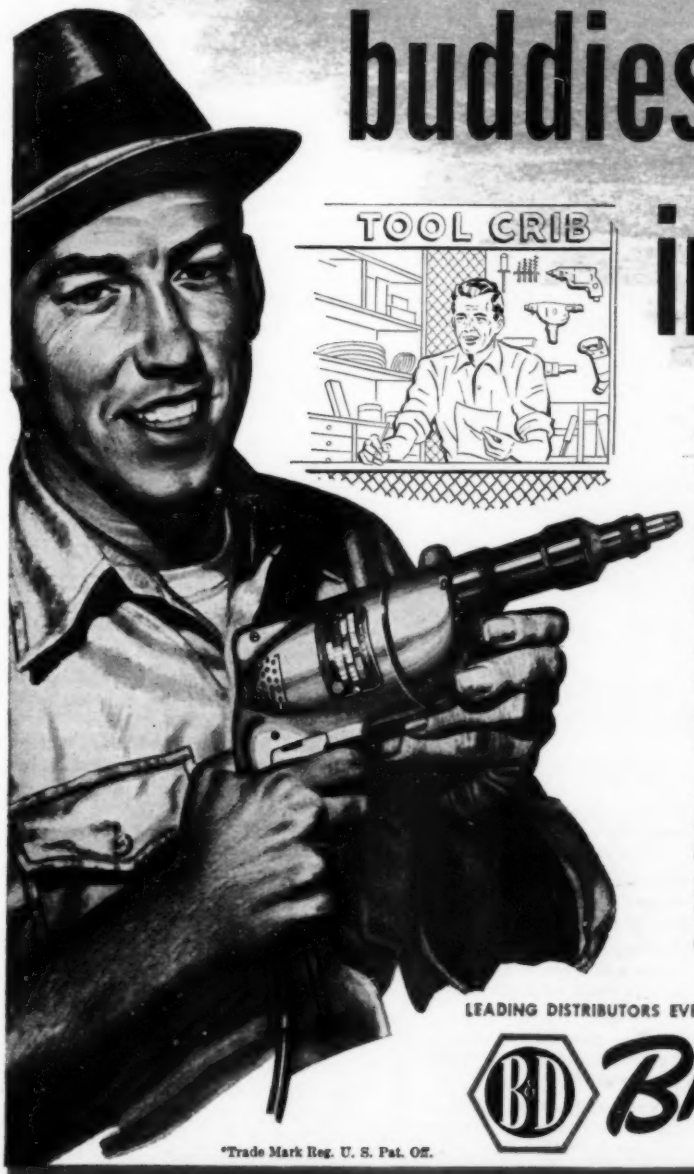
"We were buddies back in school"



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ASSOCIATION NEWS

(Continued from page 4A)

NECHANICKY, Albany, membership secretary; RENO S. KNOUSE, Albany, recording secretary; MARGARET HUTCHINS, Ithaca, past-president; and ALBERT C. TRUMAN, DeRuyter, historian.

INDUCTED INTO MU SIGMA PI

John A. Backus, manager, Department of Education, American Type Founders, Inc., was inducted into the Mu Sigma Pi Fraternity, Wayne University, Detroit, Mich., at a special initiation ceremony on April 18, 1952.

New York State Vocational and Practical Arts Steering Committee

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- Quick, simple, positive adjustments for depth (2⅜" to ¾") and angle (90° to 45°).
- Safety assured by completely guarded saw and instant trigger switch control.

TWENTY-THIRD ANNUAL SUMMER BANQUET

Alpha Chapter of Epsilon Pi Tau Fraternity held their annual summer banquet program in the new multi-million dollar Student Union at the Ohio State University, on Wednesday, July 23, 1952.

A distinguished speaker, Admiral Edwin J. Taylor, Jr., spoke on a timely topic, "New Horizons in Technology."

OFFICERS OF IOTA LAMBDA SIGMA

National Officers of Iota Lambda Sigma for 1952 are: president, Dr. Charles P. Scott, professor of education and director of courses in vocational teacher education, University of Pittsburgh, Pittsburgh, Pa.; vice-president, Herman F. Hinton, state supervisor of trade and industrial education, Tallahassee, Fla.; secretary-treasurer, Clyde H. Wilson, professor of industrial education, University of Tennessee, Knoxville, Tenn.; historian, Leonard R. Booker, state teacher trainer of industrial education, Clemson College, Clemson, S. C.

THE 1952 CONVENTION OF THE A.I.A.A.

The American Industrial Arts Association held its 1952 convention on April 29 to May 3 at the Congress Hotel in Chicago.

About forty industrial-arts supervisors, members of the American Council of Industrial Arts Supervisors, met in six workshop sessions on Tuesday and Wednesday, April 29 and 30. Nearly one hundred members of the American Council on Industrial Arts Teacher Education met in three sessions on Wednesday, April 30. The high light of this one-day convention was the presentation of the First-Yearbook of this organization at the luncheon meeting, which was attended by more than sixty individuals.

The convention proper of the American Industrial Arts Association began on Thursday, May 1, with the First General Session at 10:00 a.m. The second general session was held at 8 o'clock on Thursday evening and the final general session and business meeting was held on Saturday morning, May 3. The attendance at these general sessions ranged from 150 to 250. Alfred P. Haake, representing the General Motors Corporation, showed a fine understanding of industrial arts in a keynote address delivered at the first general session. Walt Durbahn, who has presented nearly 200 half-hour television shows entitled "Walt's Workshop," showed a kinescope of one of his programs, discussed it and conducted a question and answer

(Continued on page 8A)

train students faster, more thoroughly with WALKER-TURNER

filmstrips

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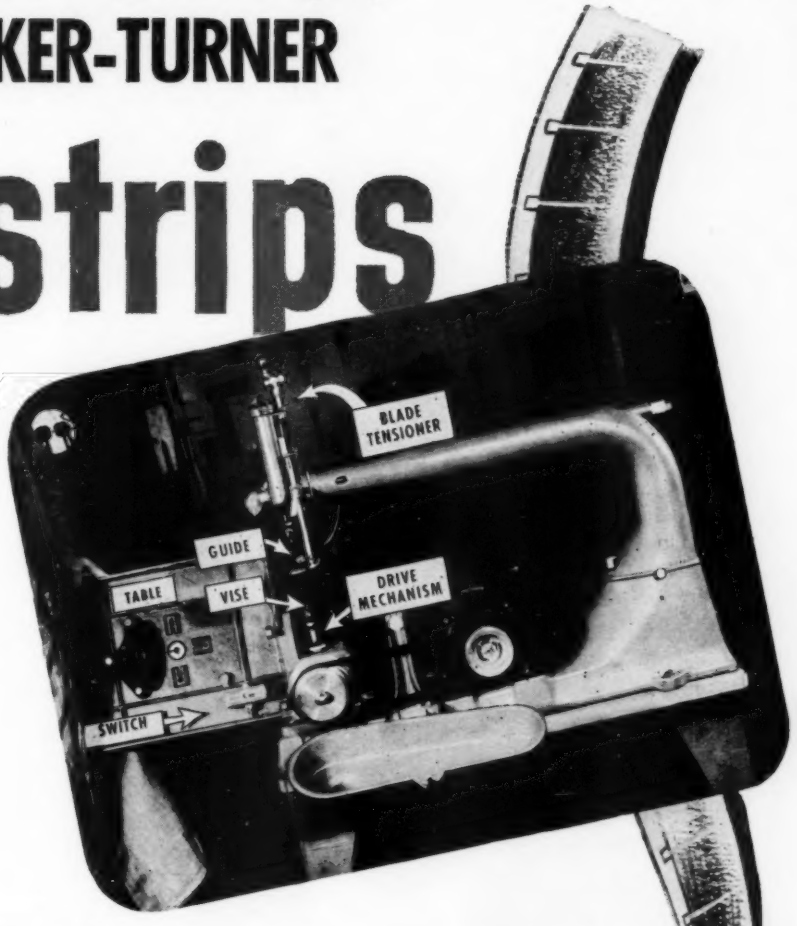

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You can teach students faster in the correct way to use power tools, and train them more thoroughly with Walker-Turner Stripfilms. Not only are such questions as "*How does the toothed pawl operate to prevent kickbacks?*" answered clearly, but directions and suggestions to the teacher for showing the films are included in a teaching guide prepared for each stripfilm.

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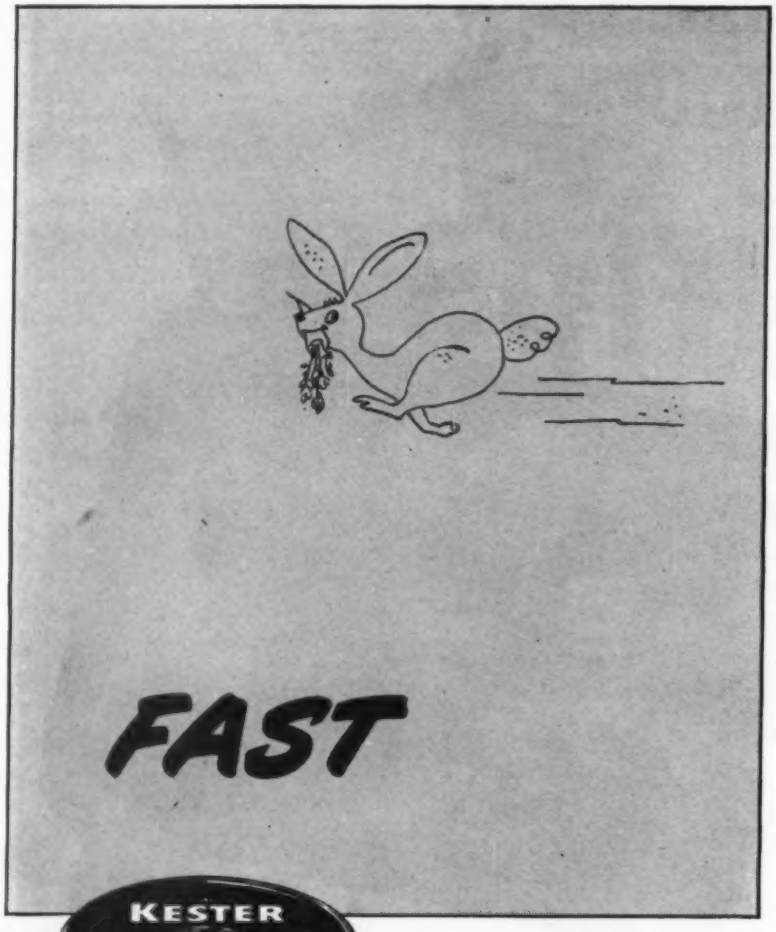

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ASSOCIATION NEWS

(Continued from page 6A)

session at the second general session, Thursday night. At the session held on Saturday morning, L. F. Livingston from the Du Pont de Nemours Corporation, Wilmington, Dela., gave an exhibit discussion on the plastic industry. An illustrated lecture on "Leathercraft in Capsules" by Raymond Cherry from Lockport, Ill., followed.

The new officers for the coming year are:

President, Gordon O. Wilber, Oswego, N. Y.; vice-president, Fred J. Schmidt, Jr., Muncie Ind.; second vice-president, Kenneth W. Brown, Philadelphia, Pa.

At the convention banquet held at 7:00 p.m. Friday night, May 2, Director Louis V. Newkirk of the industrial-arts division of the Chicago Public Schools acted as toastmaster.

Immediately following the convention banquet "Wes" Stephens representing McKnight and McKnight of Bloomington, Ill., who was the Ship's Deck Officer for the 1952 AIAA Convention, assumed the position of master of ceremonies. "The Buccaneers," a group of entertainers appearing regularly over radio station WLS in Chicago, furnished the entertainment. The Ship then distributed its prizes.

The annual business meeting of Epsilon Pi Tau chapter sponsors and trustees, held at the American Industrial Arts Association at Chicago, conducted an initiation at 4:00 p.m. on Thursday. This was followed by the Epsilon Pi Tau banquet which also was open to AIAA delegates, who were not members of the fraternity. The dinner was attended by more than one hundred persons. The formal after-dinner presentations were made by J. Homer Winkler, president of the International Association of Printing House Craftsmen and by John R. Ludington, specialist in industrial arts education, United States Office of Education, Washington, D. C.

WISCONSIN ASSOCIATION FOR VOCATIONAL AND ADULT EDUCATION CONVENTION

The 1952 WAVAE convention was held May 7 to 10 at the Loraine Hotel, Madison, Wis.

The Wisconsin Association of Directors of Vocational and Adult Education held their meeting devoted mostly to committee reports on Wednesday morning, May 8, 1952.

At the afternoon session the problems of vocational and adult education were discussed.

The first general meeting of the organization as a whole was held on Friday morning, May 9. John Te Poorten was the chairman.

Walter J. Kohler, Jr., Governor of Wisconsin, was the first speaker. He explained that he had proclaimed the week of May 11 to 17 Vocational and Adult Education week specially to call the attention of all citizens of our state to the fact that our vocational and adult education program has done a very outstanding piece of work during the past forty years.

He called attention to the importance of all students taking some practical work in school even if they are not preparing for a trade.

He also lauded the work done by the homemaking department and the rehabilitation department.

Leslie W. Johnson, president of the Wisconsin Education Association, emphasized that the gen-

(Continued on page 22A)

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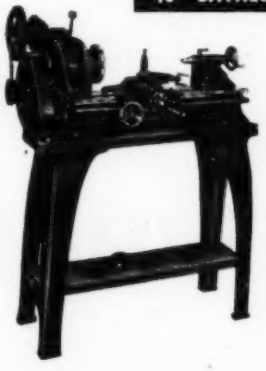
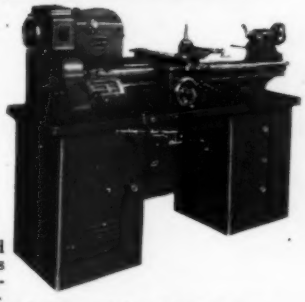
10" LATHES



The only low-cost lathes with Timken tapered roller bearings. 16 spindle speeds; power cross and longitudinal feeds standard equipment. Greatest value by far for school shops.

CLAUSING 12" LATHES

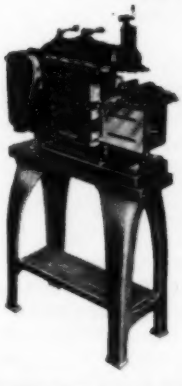


Clausing 6300 and 4800 series 12" lathes have the power, precision, capacity, ruggedness to teach lathe fundamentals with maximum thoroughness. Timken bearing equipped, quick-change gears, 12¾" swing over bed, 24"–36"–48" between centers.

MILLING MACHINES

You can instruct in *all* milling operations with Atlas millers. Timken bearings, 8 spindle speeds—62 to 2870 rpm. Back-geared power. V-belt drive. Only low-cost miller available.

7" SHAPERS



The only compact shapers with *all* the sturdy construction and operating features of large shapers, built down to size. Timken tapered roller bearings. Crank type ram drive. 3 speeds, 5 automatic cross feeds.

CLAUSING 18" DRILL PRESS

New, heavy-duty drill with many exclusive features for broad and thorough instruction. Drills to center of 18¼" circle. Capacity, ¾" in steel, 1" in cast iron — 6½" spindle travel.

DRILL PRESSES

15" floor and bench models include new operating and durability features. 4-ball bearing "floating drive" for long accuracy life. Extra-heavy head, table, column, base. New depth control stop. 12¾" bench size also available.

FREE Five helpful Wall Charts and Atlas Catalogs. Send for them today.

ATLAS PRESS COMPANY
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Atlas DEPENDABLE QUALITY TOOLS SINCE 1911

start the new class with

Silver Steel®

Start your new students with the quality saw they'll want throughout their lives. Teach with the exceptional comfort, speed and service of Atkins *Silver Steel.*

Atkins gives you quality school-size saws that are ideal for younger classes—as well as a complete line of full-size saws. The Atkins 65-J, for example, is an exact scaled-down counterpart of the famous Atkins 65. It has the same taper grinding, the same mirror polish, the same filed and set blade. And, like its larger running mate, the 65-J has the *Perfection* handle, in smaller size—to direct every ounce of effort straight to the center of the cutting edge.

Atkins also gives you school-size back and safety keyhole saws. Get those last-minute requisitions in right away—and specify *Silver Steel.*

Use the Atkins Job Rotation Chart to schedule each student for all major shop activities. Order one for every class—$2.50 each.

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ATKINS

E. C. ATKINS AND COMPANY • INDIANAPOLIS 9, INDIANA

"OLIVER"

No. 194-D Hollow Chisel

MORTISER

Safe, easy to operate . . . handles wide range of mortising and boring

This "Oliver" Mortiser is ideal for school shops. Cuts clean, accurate mortises up to ½" wide, 4" deep in edge of 22" board using table; 32" board without table. Equipped with compound table with rack and pinion feed, 28" long. Has 22" vertical adjustment, 7" horizontal travel; tilts to right or left. Adjustments quickly made. Has latest safety features. It's a sturdy machine, built to give years of service. Write for Bulletin 194-D.

"OLIVER" MACHINES FOR SCHOOL SHOPS

Band Saws	Jointers	Surfacers	Speed Lathes
Boring Machines	Jig Saw	Sanders	Spinning Lathes
Circular Saws	Mortisers	Shapers	Wood Trimmers
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OLIVER MACHINERY COMPANY, GRAND RAPIDS 2, MICH.

ARMSTRONG

Teach with the tools actually used in industry

with ARMSTRONG TOOL HOLDERS — used in over 96% of the Machine Shops and Tool Rooms. A complete system of Tool Holders comprising over 250 sizes and shapes. Develop "tool sense" and a love for fine tools with ARMSTRONG Drop Forged WRENCHES — Hi-Ten and Armaloy Steel Open End Wrenches; Box Socket and Detachable Socket Wrenches with improved designs, better balance, finer machining and finish. Set up jobs with modern, safe ARMSTRONG Drop Forged Setting-Up Tools. Use ARMSTRONG Drop Forged Clamps that never slip, spring or spread, and ARMSTRONG Drop Forged Lathe Dogs that are standard everywhere.

Write for Catalog and Cutter Grinding Charts, sent upon request to Instructors.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

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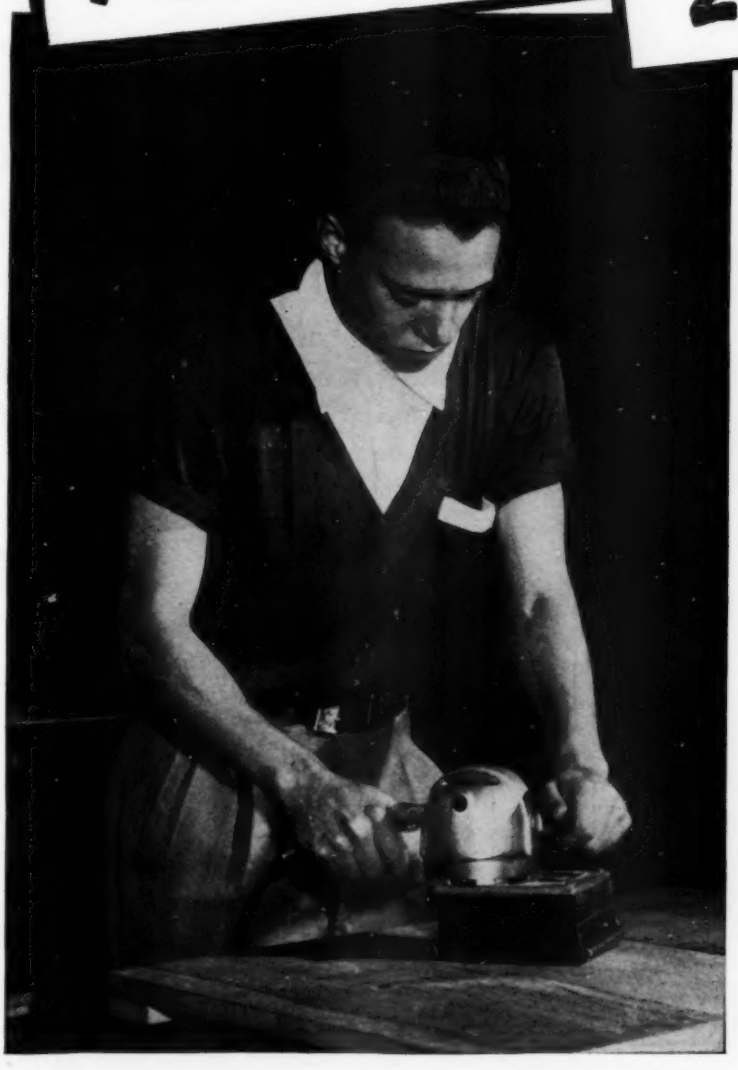
SKIL Double-Duty Oscillating Sanders Answer Every Training and Maintenance Need

1 Train students with the tool they'll use as professionals.

2 Pay for themselves on maintenance work.



You'll find students more confident—quicker to learn—when you use a SKIL Oscillating Sander in vocational training classes. For these great tools feature ease of handling—faster operation—satin-smooth finishes on all materials, whether wood, metal or composition.

SKIL Oscillating Sanders serve a double purpose. Fine for maintenance work, too, they pay for themselves many times over in refinishing blackboards, desks, chairs, cabinets and other school fittings.

You can always rely on *SKIL* for faster work, finer workmanship!

• • •

SHOWN AT LEFT—SKIL Oscillating Sander, Model 438—One of the fastest-cutting, portable finishing sanders made. Exclusive compound motion produces the smoothest possible finishes.

Sanding surface: 4½" x 5½" (⅓ sheet). Ball bearings throughout. Sealed against dust and dirt. Length overall: 7¾". Net weight: 7½ lbs.

SKIL Home Shop Oscillating Sander—Model 578

Features extreme light weight for easy one-hand operation. *Ideal* for lighter maintenance requirements. Sanding surface: 3⅝" x 7⅜" (⅓ of standard paper). Sealed ball bearings throughout. Overall length: 8⅜". Net weight: 5 lbs.

SKIL PORTABLE TOOLS

SKIL Products are made only by SKILSAW, Inc., 5033 Elston Avenue Chicago 30, Illinois

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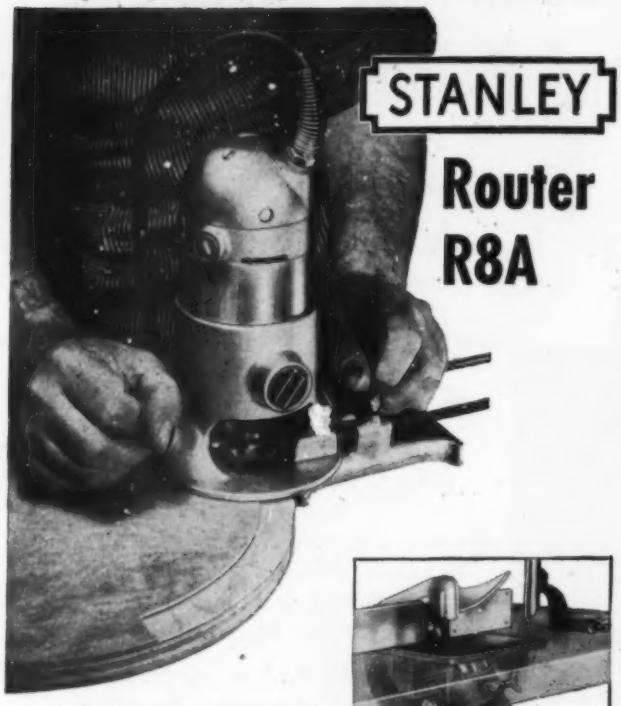
Factory Branches in 34 Principal Cities
In Canada: Skiltools Ltd., 3601 Dundas Street West, Toronto 9, Ontario

FOR COMPLETE INFORMATION, CONTACT YOUR SKIL DISTRIBUTOR, OR WRITE DIRECT

helps develop creative skill



STANLEY

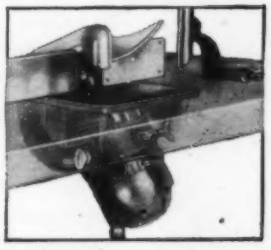
Router R8A

When you put the Stanley Router R8A in the hands of your students you help to build confidence, give them an opportunity to develop and demonstrate their creative skill.

There's practically no limit to the number of operations this versatile tool can perform. Use it for inlaying, veining, rabbeting and many other woodworking jobs. Easily interchanged attachments and accessories make this complete power unit—*many tools in one.*

Stanley Router R8A has ½ h.p. high-speed motor—20,000 r.p.m.—assures a smooth cut with or against the grain. Operates on A.C. or D.C. Weighs less than 7 lbs.

See this basic creative tool at your dealer's. Also available is Booklet "Get the Best From Your Stanley Router". Price 10c. Send for catalog showing complete line of Stanley Electric Tools.



For Shaping. Converts R8A to a bench shaper for making a variety of moulding and shaping cuts on straight and irregular work. Arbor tilts to 45°.

For Dovetailing. Available in two sizes for stock to 12" and 16" wide. Easy to use. For wood or plastics.

Attachments for Planing, Beading and Fluting, Grinding, and Overarm Mounting also available.

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☐ Send me your catalog.

☐ Send booklet "Get the Best from Your Stanley Router". Enclosed is 10c per copy.

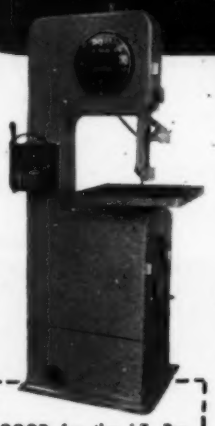
Name .....

Subject you teach .....

School .....

City ..... State .....

PRICED AND DESIGNED WITH THE SCHOOL SHOP IN MIND



DoALL UTILITY BAND MACHINE
DOUBLE RANGE • VARIABLE SPEED
16" COMBINATION WITH WELDER
SAWS • FILES • POLISHES

GOOD for the I.T. Program

BETTER for the School Shop Budget

BEST for the Student

STUDENTS quickly acquire skill, develop pride of accomplishment and enjoy learning to machine a great variety of materials with professional ability on this safe, easy to operate contour sawing, filing, polishing machine.

Because of its construction features and responsive control of variable tool speed in both high and low range, the Utility DoALL is capable of turning out school shop projects to the most exacting standards of workmanship and accuracy.

This machine invites comparison—price and performance. Ask for a free demonstration. Call your local DoALL Sales-Service Store or write:

SEND FOR BULLETIN

DoALL

B-14

THE DoALL COMPANY
254 N. Laurel Ave.
Des Plaines, Illinois

Speed, long 60-inch table and 37-inch fence step up production!

Here is fast, smooth operation with all the quality and fine workmanship long associated with Heston & Anderson. Modern and compact, built for heavy duty, the new 58-60 Jointer makes a sound addition for any plant or work shop.

WRITE TODAY! For FREE Literature . . . name of nearest authorized dealer.

HESTON & ANDERSON
DIVISION OF ST. PAUL FOUNDRY & MFG. CO.
15–2B FAIRFIELD, IOWA

Battery of Logan Lathes in Shop of Eliot Junior High School, Pasadena, California

Write for catalog information on the complete line of Logan 10" and 11" Lathes and 8" Shapers.

THE features that make Logan Lathes top rank industrial tools are equally effective in school shops. Versatile Logans equip the instructor to teach every type of lathe operation. 11" swing, 1" collet capacity, 1⅜" spindle hole, and 24" and 36" center distances permit a wide range of projects involving work of substantial size. The student learns on the same accurate lathe he will later encounter in the shops and production lines of industry. For the young operator's safety, Logan design encloses the headstock, countershaft and motor; and makes controls and switches easily accessible. Rugged, durable construction assures sustained accuracy and dependable operation through extra years of school shop use. As for economy, no other lathes of comparable specification match the Logan low initial cost and low operating cost. For all these reasons, Logan Lathes provide the finest school shop training within range of the moderate budget.

LOGAN ENGINEERING CO.

4901 W. Lawrence Avenue • Chicago 30, Illinois

The Sensationally NEW Low-Priced

PARKS No. 20
20" PLANER

Here is a modernly designed, rugged, high-speed, low-priced planer that is ideally suited for every shop and industrial plant requiring a quality surfacer. The Parks No. 20 Planer has a four-knife cutterhead with a speed of 3600 R.P.M. and offers two feed speeds — 20 and 40 F.P.M., and 40 and 80 F.P.M. Write for complete descriptive literature.

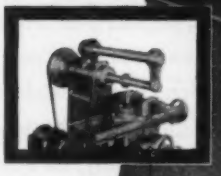
The PARKS Heavy-Duty 12" x 4" Planer

A compact, sturdy, thickness planer that offers mill planer precision and ruggedness at a sensationally low price. Write for descriptive catalog sheet.

The PARKS WOODWORKING MACHINE CO., Dept. 22-A17 1546 Knowlton St., Cincinnati 23, O.

Train students FASTER... train them EASIER— on a

benchmaster



Benchmaster converts from vertical to horizontal milling simply by exchanging spindle assemblies. Accuracy meets regular commercial machine tool requirements.

Available with or without pedestal.

FULL LINE OF ACCESSORIES for use with Benchmasters: 6" Rotary Table, 4" Swivel-base Vise, Pedestal Base, Splash Tray, Drawbar Collets from 1/16" to 1/2" in fractional steps.

A Versatile, Low Cost Milling Machine for Student Instruction and General Shop Use

In Benchmaster, you have a *basic* milling machine—capable of all milling operations, both horizontal and vertical—but without confusing and complicated automatic controls! Benchmasters are easy to use, easy to learn on. Yet these mills are as efficient as the biggest on work within their capacity.

Built for and used by worldwide industry, Benchmasters have earned an enviable reputation in the small machine class. Use them in your shop with complete confidence. Their low cost makes it easy to equip your shop.

benchmaster

MANUFACTURING COMPANY
1835 W. Rosecrans Avenue, Gardena, California

how many advantages can you spot?

A quick look at these Cincinnati Tray-Tops should reveal up to ten important features you don't normally expect in an economy-priced lathe. And they're all worth considering on your next lathe purchase. You'll serve your students well by providing instruction on Tray-Tops . . . the prices are lower than you may imagine. Swing sizes: 10", 12½", 15" and 18". Write for new catalog and name of your dealer.

1. All geared head (12 speeds, 48 thread and feed changes. 2. Enclosed electrical panel protects equipment and users. 3. Master disconnect switch integral with panel lock. 4. Cabinet legs have ample storage space. 5. Three-lever speed selector with direct-reading dial permits quick shift to any of 12 spindle speeds. 6. Drop levers disengage if accidentally pushed. 7. Exclusive "Tray-Tops" on headstock and tailstock provide convenient parking space for tools, mikes, etc. 8. Totally enclosed change gear box. 9. Ground bedways. 10. Double walled one piece apron.

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CINCINNATI 9, OHIO, U. S. A. cincinnati lathe & tool co.

20" TILTING TABLE JIG SAW

TABLE SIZE SPINDLE SHAPER

20" TABLE SIZE SABER SAW

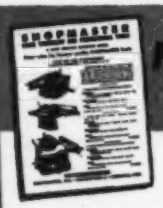
12" DRILL PRESS

BELT AND DISC SANDER

10" SWING WOOD TURNING LATHE

12" TILTING TABLE BAND SAW

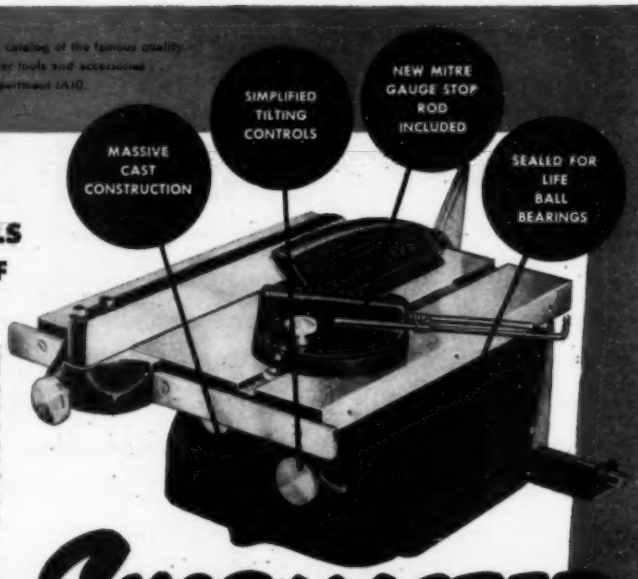
10" TILTING ARBOR SAW



FREE Complete catalog of the famous quality Shopmaster tools and accessories . . . Write Department IA10.

SHOPMASTER TOOLS MEET DEMANDS OF ALL SCHOOLS

Shopmaster Woodworking Tools are today's best school shop buys! They're priced as low or lower than any on the market . . . yet give you more outstanding precision features (many of them Shopmaster exclusives) for a lifetime of accurate, dependable shop service. You'll appreciate their extra heavy, rugged construction, fine precision bearings, simplified operation and exceptional versatility. The engineered simplicity of Shopmaster Tools enables students to learn quickly . . . and gives them a broader understanding of basic machining principles. When you make up your equipment requisitions this year . . . keep low cost Shopmaster recognized quality tools in mind.


MASSIVE CAST CONSTRUCTION
SIMPLIFIED TILTING CONTROLS
NEW MITRE GAUGE STOP ROD INCLUDED
SEALED FOR LIFE BALL BEARINGS

SHOPMASTER

8" TILTING ARBOR SAW

$49.95

Slightly lower Zone 1

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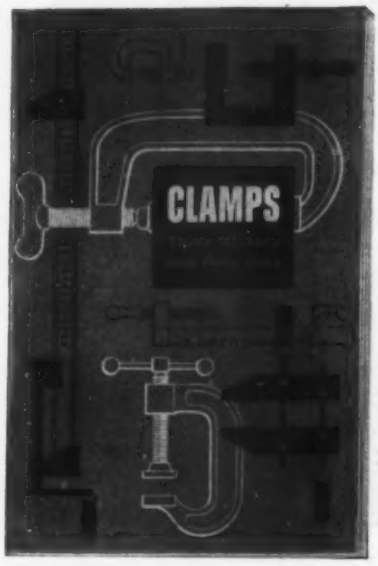
Write for this FREE Booklet Today——



Interesting

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Informative

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Adaptable to Classroom

Catalog also available showing Clamps, Chisels, Punches, Brace Wrenches, Star Drills, Washer Cutters, File Cleaners, etc.

THE CINCINNATI TOOL COMPANY

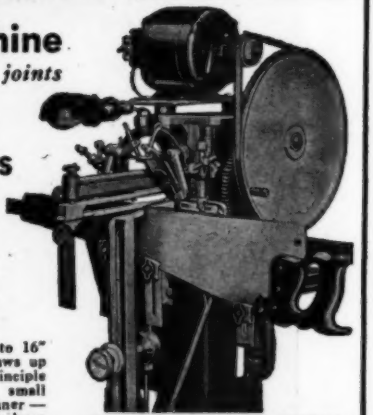
WAVERLY AND MAIN AVE. CINCINNATI 12, OHIO

SAW FILING

This ONE Machine

automatically files and joints

HAND, BAND, CIRCULAR Saws



The Foley Saw Filer is ideal for sharpening saws used by students in school shops. It keeps them in tip-top shape, faster and better than by hand filing. Used by Army, Navy, hundreds of manual training departments and industrial plants. The Foley is the only machine that files and joints all hand, back and mitre box saws from 3 to 16 points per inch, crosscut circular saws up to 16" diameter (24" optional), and band saws up to 24' long. Patented jointing principle automatically evens up large and small teeth, so saws cut faster, truer, cleaner — stay sharp longer. Foley filed saws have less breakage and last longer.

30-DAY TRIAL OFFER

You may have the privilege of using the Foley Saw Filer in your own shop for 30 days. Write or send coupon for details and list of school users.

TYPICAL SCHOOL USERS

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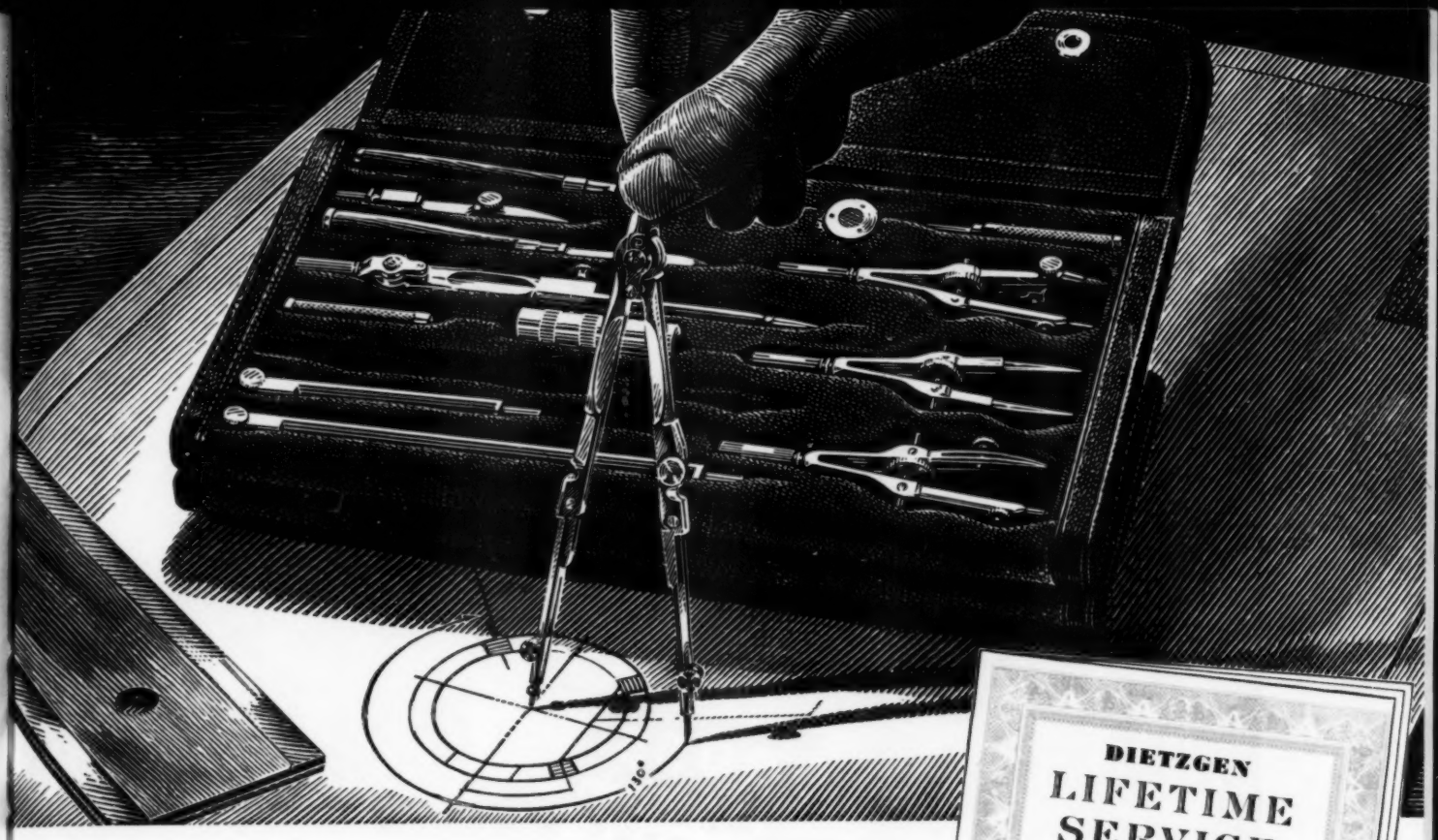
FOLEY *Automatic* SAW FILER

FOLEY MFG. CO., 3318 N.E. 5th St., Minneapolis 18, Minn.
Please send full information on 30-Day Trial Offer and list of school users of Foley Saw Filers.

Name.....

Address.....

School.....



These proud possessions are protected for an entire lifetime by

DIETZGEN LIFETIME SERVICE POLICY

Every year thousands of youngsters reach the point in their schooling where each is suddenly faced with the requirement of purchasing a set of drawing instruments. When the boy is the son of a technically trained father or when he asks the advice of a conscientious drafting instructor, the problem of selecting the proper drawing instruments is quickly answered. These men know drawing instruments are normally purchased but once in a lifetime, that the make of instruments selected can be either a matter of many years of rewarding satisfaction or of continual regret.

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They know that the slightly higher cost of world-renowned Dietzgen Drawing Instruments is not only a trifling amount when divided by the years of use but an actual economy when the precision, craftsmanship and higher resale value of genuine Dietzgen Instruments are considered.

They know as well that Dietzgen Drawing Instruments are truly a *lifetime* investment in more ways than one. For these instruments are protected by Dietzgen Lifetime Service Policy. This longstanding policy stipulates that Dietzgen instrument designs are standardized so that lost or damaged parts can be replaced with perfectly fitting parts made from the same tools and with the same skill as the original parts. And this policy stipulates that ***adequate supplies of such parts will be maintained for the entire lifetime of any purchaser of a set of Dietzgen Drawing Instruments.*** How much more imperative then in the face of these true and lasting values that the choice of instruments be without question a Dietzgen set?

EUGENE DIETZGEN CO.

Chicago • New York • San Francisco • New Orleans
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DIETZGEN
LIFETIME SERVICE POLICY

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First, Dietzgen Drawing Instruments are standardized to prevent minor design changes from interfering with the interchangeability of parts. Second, it has long been the policy of the Eugene Dietzgen Co. to maintain adequate reserve stocks of such original parts for the entire possible lifetime of any purchaser of any Dietzgen set offered. Every buyer of a new set of Dietzgen Drawing Instruments is thus assured he can always keep his set in good-as-new operating condition.

Dietzgen standardization of drawing instrument designs and the Dietzgen Lifetime Replacement and Repair Parts Policy are valued highly for the convenience and savings they assure both individual owners and volume users (educational institutions, trade schools, etc.) of Dietzgen Drawing Instruments. Lost or damaged parts can be replaced with perfectly fitting Dietzgen Repair and Replacement Parts made from the same tools and with the same skill that produced the original parts. Your Dietzgen dealer or the nearest Dietzgen branch is ready to serve you. Institutions may obtain Dietzgen Repair Parts Kits containing the parts most frequently required for servicing a quantity of sets of the same grade.

DIETZGEN—Manufacturers of fine Drawing Instruments for nearly 70 years.

DIETZGEN

EVERYTHING FOR DRAFTING SURVEYING AND PRINT-MAKING

3 BUSS PLANERS

IDEALLY SUITED TO VOCATIONAL TRAINING

Ranging in capacity and price to suit each teaching and budget requirement.

STANDARD PLANERS that are widely used in industry as well as school shops.

Operated and adjusted identically with larger planers.

Built for high quality planing with maximum safety.

Incorporating big planer features such as built-in knife grinder and jointer which enables instructor to keep the knives sharp with little time and effort required, thus permitting student to do good work.

Built by the leaders in the planing field.

Planer specialist since 1862.

for the planer that exactly suits your needs, write for complete descriptive folder.

BUSS No. 4L Wedge - adjusted bed. Capacity: 24" x 8". The finest which may be had for school shop training.

BUSS No. 248: Capacity: 24" x 8". Double Hoist Screw bed. Other than the No. 208, there is nothing in the low-cost planer field that approaches it as a sound school shop investment.

BUSS No. 208: Capacity: 20" x 8". The lowest-cost, *thoroughly practical* planer on the market.

BUSS MACHINE WORKS

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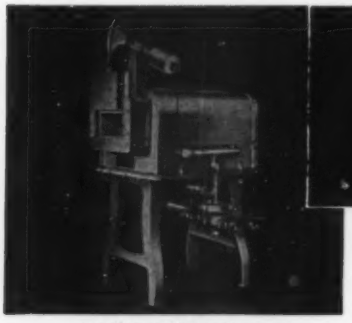

Small Semi-Muffle Oven

Sunbeam STEWART

THE BEST INDUSTRIAL FURNACES MADE

Small Forge

HUNDREDS OF THESE SUNBEAM STEWART FURNACES ARE IN THE VOCATIONAL DEPARTMENTS OF TECHNICAL SCHOOLS

Round Pot Furnace

Because Sunbeam Stewart units have been designed for efficient production heat treating in small shops and tool rooms, they are widely recognized as standard equipment for all types of industrial heat treating and vocational training work. For student instruction and reference, write for our free "Guide to Furnace Selection." Aids in determining the type of furnace best suited for any work. Also ask for the new Data File on school units.

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Main Office: 4433 Ogden Ave., Dept. 114, Chicago 23, Ill.
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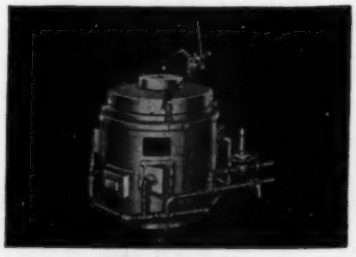
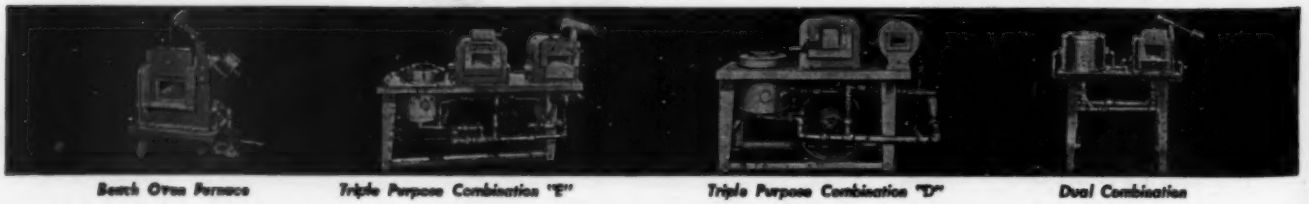


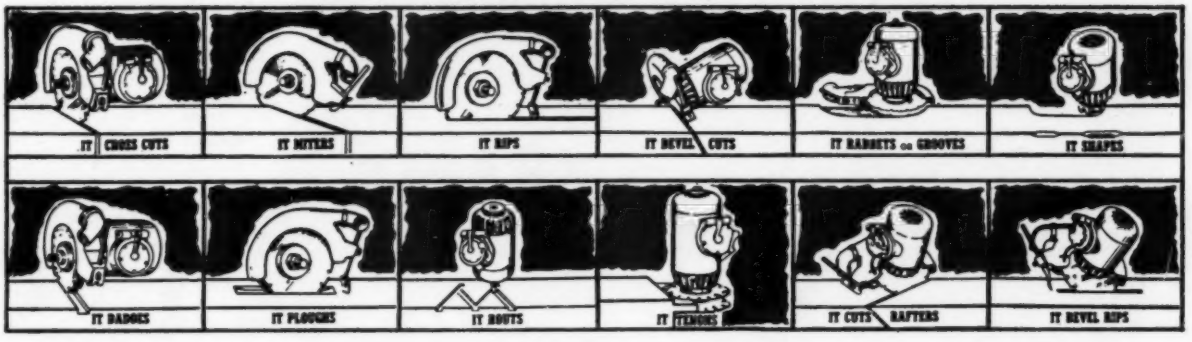
Melting Furnace



Bench Oven Furnace *Triple Purpose Combination "E"* *Triple Purpose Combination "D"* *Dual Combination*

Now teach 12 operations with one LOW-cost unit!

FASTEST...SAFEST...MOST ACCURATE



More and more instructors are insisting on "De Walt" as basic equipment in their shops. They've found that men should be De Walt trained, as De Walt is in universal use.

As a power saw, it performs every machine cut possible. With a few inexpensive attachments, it becomes a jig saw, a lathe, a sander, a drill, even a metal cutter. It's the self same saw you'll find in plants, mills and shops all over the country.

But you've got to see De Walt in action to fully appreciate its amazing versatility. Ask your nearest De Walt dealer for a free showing of the 16mm sound film: "A complete Power Shop in One Machine." You'll see for yourself what a powerful teaching aid a De Walt can be.

AMF
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DE WALT INC., Lancaster, Penna. · Subsidiary of
AMERICAN MACHINE AND FOUNDRY CO.
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"the best that money will buy!"

YA J-LINE

WOODWORKING MACHINES

Yes, "the best that money will buy" . . . is the acclaim given J-LINE woodworking machines by schools the country over! Send for complete information on this modernly designed, quality line . . . engineered and built by Yates-American . . . leaders in woodworking machinery since 1883.

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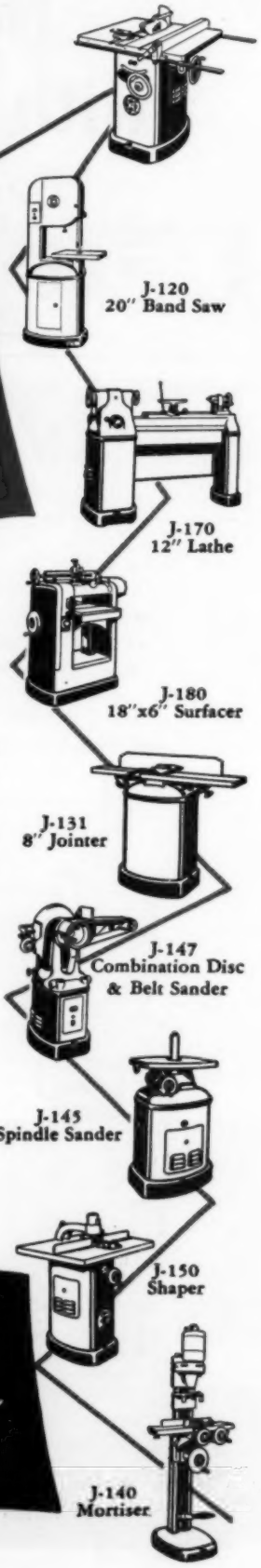
- DESIGNED FOR SAFETY
- STURDILY BUILT
- EASY TO OPERATE AND MAINTAIN



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INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

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The School and Public Relations

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The little red schoolhouse has gone cosmopolitan. It was public all these years, a center for teaching in the community, but inhabited largely by the school ma'am and pupils. Aside from the occasional spelling bee, there radiated little learning beyond the edge of the schoolyard. The teacher reigned supreme in this center of culture and fashioned the intellectual destinies of the boys and girls roundabout. In the rural districts she boarded around from farm to farm, rose early and plodded to school through the snow and mud. In the city she walked primly to class, correct in appearance and precise in manner. The townspeople expected her to be conservative, firm in her control of pupils and sagacious in attitude. An essential attribute was the ability to "keep school." The three *R's* were an accepted fact, and the teacher was responsible only to the board of directors. Little thought was given to those links of understanding and co-operation that might develop between instructor and community to further the cause of education. Learning was stagnant, consisting of mastering the contents of obsolete, tattered books that had passed down the line of children. In this situation public apathy could not get a foothold to gain an interest in education, and the thought of co-operative efforts between teachers and community was almost nil.

Teacher Contacts

The teacher now lives in a glass house. No longer can the activities of the classroom escape the scrutiny of the community. This day of gadgets has drawn all people into closer contact, resulting in a greater awareness of other folks, other ideas, and other problems. The teacher has become an integral part of the community and must work co-operatively or be bruised in friction. The contacts are legion. To mention a few will serve to illustrate the situation.

Parent-Teacher Association. The PTA's are still new in many cities, and still feeling their way. To organize such a group and to provide continued inspiring leadership calls for ability that is sometimes hard to find. But these contacts pay off.

Newspapers. The papers are a force, more or less dynamic, and can do much to strengthen the cause of education. They must not be alienated.

The Parents. Adults are not to be neglected, no matter how impractical their notions about learning may be. They are voters, have a voice in mapping school plans and should become partners with the school instead of being adverse critics.

Civic groups. School people need to be joiners, not to cultivate support, but to be a part of constructive movements. The unselfish member will seek to contribute time and thought to human betterment.

Open House. These may be at school or otherwise, but the teacher will find opportunities to greet people, take part in activities and win support for the program. Too often these chances are neglected.

Employers. Since the advent of adult education, many students who are employed attend evening classes or are on a part-time day program. Employers are interested in upgrading their personnel and welcome the efforts of the school. This is especially true in vocational classes. Teachers and administrators cannot afford to lose contact with the employing group. They are to be considered, for much can be gathered from such associations.

Public Exhibitions. If a game is on, the teacher should be there, rooting for the home team, being glad for the victories and taking part in the activities. Old and young are wont to be at play on occasions, and the teacher cannot afford to stay away. Parades, public gatherings, and other civic activities should find the faculty on hand.

There are many other avenues for teacher contact, many means for expression, be the community large or small. If talent is needed to address public gatherings, the opportunity should not be overlooked. With shorter working hours for people, more social events are on the calendar. No one should be a wall flower. It may be in church activities that help is needed or at graduation exercises. Leadership is always in demand and appreciated. Whether he be administrator or classroom teacher, the community expects service. Some folks are joiners, others are actors and musicians. Some are the quiet kind, filled with sympathy and help, but all these good qualities are factors in improving the work of the school.

Public Appraisal

There is an old saying that the man who pays the fiddler has the right to call the tune. Whether that tune means harmony, a medley, or plain jargon depends on various factors, some of which may be serious.

We live in a democracy, with everybody having a right to speak up. What each one thinks and does about a teacher may be good, bad, or indifferent, but out it comes. Acceptance or rejection means a lot to a schoolman and often hangs by a thread. Not to argue the merits of such judgment, but to recognize that public relations may break off at this point is a matter of concern.

It is easy to be critical of little things. Pupils are blamed for asserting their individuality when they should be complimented. If the shoe is on the other foot, it hurts. A citizen is critical of the way a class is conducted and calls the teacher a failure. Granted that the charge is groundless, it still hurts. Here is a chance for the school to contact the critic, correct his point of view, if possible, and strengthen the relations between them. And there is always a possibility that the criticism is justified. In either case the teacher has some work to do.

Great compliments come to the school, unsolicited and unexpected. There are students who have caused trouble all along the line. Maladjusted, slow to learn, quite unpromising, given up by parents and neighbors alike, they are turned over to the teacher with the donor's blessing. It is an easy way out to drop the unsolved problems on the doorstep of the school, and a bit tough on the teacher, but the challenge is being accepted every day. To reject the chance is to court failure.

Another old maxim comes to mind. "Those who know how, do. Those who don't know how, teach school." What an indictment! In some classes inability to perform on the part of the teacher means failure. This would be especially true in classes of adult students who are quick to note some fault on the part of the instructor. The word goes out that the faculty is impractical, does not know the field and is not familiar with the world of work. This breach in public relations needs mending at once, for each delay adds to the difficulty.

But the teacher does receive credit. The time comes when a tired and confused parent turns to the school for help. A typical case is where a parent is concerned about the low grades of his son who wants to drop out of school to go to work. The parent has great faith in an education. He has a notion that a diploma will ensure his boy a good job, fine pay, and a laudable place in the community. Brushing aside for the moment all questions of natural apathy and slowness on the part of the boy, the chance is there for the teacher to retain a friend.

If school people are going to take the lead in establishing good relations, it will be necessary to analyze public reaction to discover what is wrong and to determine what approach to make to a solution. What is the basis for the attitude, be it good or bad? If cost is a factor, then some scrutinizing of budgets may be in order. The instruction may be poor. If so, a long pull upward is ahead for the entire school. Sometimes it is a matter of personal bias. This is hard to uproot and will take understanding, tact, and patience. Valid or invalid, the appraisal comes from the public and is a clarion call to the teacher.

Responsibility for Good Relations

Who shall do the job? What person or persons in the community are accountable to the public for seeing that good relations exist between the school and its constituents? Obviously a community responsibility should not be laid at any one man's door. But we are thinking now of teachers and their part in it, so let us analyze that phase a little.

The Teacher. The schoolhouse and the program are set up to properly launch the rising generation into its life activities. The teacher meets the pupils head on, in a strategic position. At first thought it would seem that the greatest responsibility lies in the classroom, and perhaps it does. Here the young minds are molded, here the inspiration comes to go forward to become good citizens and good workmen. From the classroom radiates the teacher's influence out into the homes of the townspeople. Surely it would seem that the teacher has most to do with the job and is the key person to create and maintain good relations.

The Principal. But we cannot overlook the principal. He has much to do in establishing school policy and in creating good standards. It is his job to represent the school over the phone, in PTA meetings, at public gatherings, graduations, and all the rest. He is responsible for his building. In this capacity he fronts for his institution, pupils and teachers, bearing the brunt of public criticism and public acclaim.

The Superintendent. The city superintendent has become an essential link in the chain of education. He looks beyond the classroom, beyond the building, beyond the city limits, out into other communities. He views his school system in comparison with those in other cities, cities, larger and smaller, and must be in a position to bring significant facts to his board and to his public. Truly the superintendent plays a large part in the matter of good relations between his schools and the public.

School Boards. Next we look to the board of education. They, too, have a part to play in the total picture. School boards represent the public, being directly answerable to the people or to the appointing agency. It is their job to provide a school system, decide on expenditures, general policy, and to hire a superintendent and staff and report to the citizens. While their duties are a bit removed from actual classroom activities, they do play an important part in this business of public relations. They need to acquaint the people with plans for expansion, contemplated changes in policies and plans, often taking the brunt of caustic criticism.

The Public. Now we come to the last agency in this matter of education and the responsibility for the quality of public relations enjoyed by the schools. The public has the final say so about what kind of schools it wants and shall have. This may seem a bit odd, but many people feel that the public is the most important of all these links. A community can have a low grade, a medium, or a highly efficient system of schools, depending on what it desires. Of course, this takes leadership in the city, but the public listens to its leaders.

It is not intended here to place the blame on any one of the five agencies just discussed. The function of each one is peculiar to that position. The question seems to be, not which link is the most important in the chain, but how well each link holds. Public relations enters at each step.

Co-ordinating Community Forces

Getting along with people is a major job of the human race. He who can bring community forces and varying ideas into harmony is indeed a statesman, and the supply of statesmen is not plentiful. If the job of creating and maintaining good working relationships between the schools and the

public is to be a fact, someone must take the lead. Somebody must have the initiative and the ability to contact the right people, say the timely thing and oil the machinery so that movements can be made without friction. Let us look in on a town and discover what may take place.

Leadership. It would seem that an understanding leadership is the starting point. Ideas may rise from the rank and file, but it takes an individual to formulate the proposition and direct it into action. Even as it requires one colonel for a regiment, so one strong citizen may lead an entire community. Particularly now we are thinking of a capable leader in the school who can sense the problems and decide what to do about them. The second step is to get the job done, and this calls for more than theory.

A Plan. Straight thinking calls for proper sequence. Those who plan and arrange activities visualize the end point to be accomplished, then they list the necessary steps of procedure, and finally arrive at the conclusion. At each step the planner thinks of the people involved, problems to be met, and proper timing. These include personnel, facilities, and cost. He must be courageous, understanding, diplomatic, and resourceful. If this job falls to a schoolman, he will need special qualities in addition to being a classroom teacher.

Publicity. It is an ancient saying that no man should hide his light under a bushel. There is abundant evidence in the world that some people have taken that quite literally and have overpublicized their wares, their ideas, and themselves. This can hardly be said of teachers. These have been busy inside the schoolhouse and have too long neglected an important phase of instruction, that of carrying the community on their class rolls. Publicity requires skill and is not done equally well by all. It should be a part of good planning, already discussed, to select skilled personnel for this important piece of work.

What has been said in the foregoing is not all. The job of good relations between the schools and the public is a growing proposition, not to be measured by the same yardstick today as it was yesterday. The schools are big business and expanding greatly. Those methods and procedures that were adequate once, may need overhauling to winnow the wheat from the chaff. No longer can the citizenry hold aloof and criticize from a distance. Preparing the next generation for the problems of life is a community project, not to be relegated to the teacher entirely. It needs to be kept in mind, of course, that every occupation requires expert performance, be it as tradesman, banker, lawyer, or teacher. The technique of teaching belongs to those professionally trained. The matter of public reaction, co-operation, planning, etc. — everything that calls for good relations with the schools, belongs to an alert, intelligent citizenry. In this larger assemblage teachers should be in the front row.

Preparing and Using Lesson Plans

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Few individuals begin an extended motor trip without first consulting a road map, calculating distances and directions, considering weather and driving conditions, and tentatively deciding upon stopping places. To neglect this important preparation would be extremely foolish. While it is possible they might reach their ultimate destination without mishap, inconvenience, or loss of time, it is extremely unlikely that such would be the case. Wise travelers make their plans carefully and then follow those plans unless some unusual circumstances arise. In that case they alter the plans to suit the new situation and proceed once again.

In somewhat the same manner competent trade instructors determine their objectives, organize their courses, and follow detailed plans of procedure. There is no other way in which teaching can be really effective.

Effective instruction requires first of all a general plan. The shop instructor in the automotive field, for example, should make a list or course outline containing all the manipulative operations that the learner needs to master in order to acquire the necessary trade skills. The list will probably include basic operations covering the chassis, brakes, steering gear, rear axle, clutch, transmission, front-end suspension, and engine. Shop instructors in other trade fields should, of course, make similar lists of the manipulative operations which are common to their trades.

Trade technology instructors, too, need to make lists or course outlines of the instructional material they propose to teach. In the case of these instructors, however, it is essential that they first examine the shop outlines and then develop their own outlines to conform or correlate with the shop instruction. This implies that trade technology instructors ought to scan the shop outlines very carefully, and that they should then list the trade technology that will fit each specific item in the shop lists. Unless trade technology instructors adopt this procedure, they may encounter difficulty in arousing learner interest in trade technology content.

Developing course outlines, even though commendable as well as essential, is not

sufficient to insure effective instruction. Very few experienced instructors are skillful enough to teach from a bare outline, and for the inexperienced it is virtually impossible. For that reason it is necessary to make lesson plans for the various items that appear in their course outlines. Superior teachers always plan their instruction and then follow the plan.

Study and Discussion Outline

A. *The Nature of a Lesson Plan*

A lesson plan is a more or less detailed outline of the content of a lesson arranged in the order in which such instructional material is to be presented. It may be compared to a map which the instructor will follow in teaching the lesson, either manipulative or trade technology, and is intended for use only by the instructor, and like a map, it should be followed closely.

The mechanics of making lesson plans and the methods of using them vary widely. In trade and industrial education, however, instructors are encouraged to rely on the lesson plan based upon the four-step lesson. These steps consist of preparation, presentation, application, and testing. In developing a lesson plan involving the four steps there are, of course, several other factors which must be considered, but these steps are basic and no lesson will be effective if it fails to contain them.

B. *Making a Lesson Plan*

Title — The title of the lesson, as it appears in the lesson plan, should indicate in simple, easily understandable language exactly what is to be taught. In the automotive trade, for example, the title of a manipulative lesson might appear as follows:

Removing and Installing a Cylinder Head

It is suggested that the title for a manipulative lesson assume the grammatical form used in the sample. The primary reason is that it describes specifically what is to be taught, thus leaving no doubt in a learner's mind regarding what he is to learn. More than that, in the past so many lesson plans made use of the "How to Do This" and "How to Do That" form of title that it became monotonous.

If the lesson plan is for a trade technology lesson in the automotive field, and if it relates to the manipulative lesson in the sample, it might appear as given below:

Principles of Cylinder-Head Design and Construction

Aims and objectives — No lesson should be taught unless there are definite — and sound — reasons for teaching it. One of the first things an instructor does after selecting the title of his lesson is to write out the things he expects to accomplish by teaching the lesson. It should meet an immediate need rather than a remote one. Instructors occasionally delude themselves regarding the value of certain instructional content. Ordinarily there is little point in teaching something to learners because "it is nice for them to know," or for the reason that "they may need it after they get out on the job." In trade and industrial education of a trade preparatory nature, for example, the purpose of the instruction is to train advanced learners, not to develop highly skilled tradesmen. Since there are definite limitations to the time that is available for the instruction, it probably should be confined to training in the skills and knowledge that are essential.

Still using the sample manipulative lesson in the automotive trade, the following form might be used in listing the objectives of teaching learners to remove and install a cylinder head:

Removing and Installing a Cylinder Head

DESIRED RESULTS AND OBJECTIVES:

1. To teach the correct procedure in removing and reinstalling a cylinder head on a valve-in-head engine.
2. To acquaint the learner with the proper selection and the correct use of tools and equipment required in cylinder-head service.

Objectives such as the foregoing are specific, practical, and justifiable in any automotive course which is preparatory in nature. With these objectives before him a shop instructor knows exactly what he is going to teach and why he is going to teach it. In the event that a shop instructor is unable to develop equally specific and practical objectives for any one of his lessons, perhaps it would be wiser not to teach it.

Continuing the parallel between manipulative and trade technology lessons in the automotive field, objectives for the latter lessons may be just as explicit. The following is an example:

Principles of Cylinder-Head Design and Construction

DESIRED RESULTS AND OBJECTIVES:

1. To familiarize learners with the characteristic features of cylinder-head design and construction.
2. To teach learners the purpose of the various features of design and construction.

Equipment, tools, and materials — Certain tools, equipment, exhibits, or materials are frequently required for successfully teaching a lesson. These teaching aids should be assembled prior to the time the lesson is taught. To insure that they will be available when needed, it is good practice to list them on the lesson plan. Failure to list them involves the risk of losing the interest and attention of the group while the instructor hunts for teaching aids which will make the lesson more easily understandable.

All good lessons plans provide space for listing the various devices which are required. Ordinarily this list appears near the beginning of the plan. A sample is given below:

Removing and Installing a Cylinder Head

DESIRED RESULTS AND OBJECTIVES:

1. To teach the correct procedure in removing and reinstalling a cylinder head on a valve-in-head engine.
2. To acquaint the learner with the proper selection of the correct use of tools and equipment required in cylinder-head service.

Equipment, Tools, and Materials:

1. Valve-in-head engine (on stand or in car)
2. Cylinder-head lifting tool
3. End wrench set
4. Socket wrench set
5. New cylinder-head gasket
6. 12-in. screw driver
7. Putty knife
8. Clean rag
9. Oil can
10. Lead light

If a trade technology instructor were listing the teaching aids for the trade technology lesson, covering the principles of

cylinder-head design and construction, the list might appear as follows:

Equipment, Tools, and Materials:

1. Cylinder-head assembly (valve-in-head type)
2. Cutaway model cylinder head
3. Film strip of Buick or Chevrolet engine assembly
4. Information or assignment sheets pertaining to cylinder heads
5. Film-strip projector
6. Welsh plugs, oil lines, and similar related head parts

Step I — The preparation step. It was pointed out earlier in this guide that every lesson has four steps. The first is the preparation step. The purpose of the step is to secure the attention of the learner, to arouse his interest, and to create within him a desire to learn. No lesson can proceed satisfactorily or conclude successfully until this step has been accomplished. The instructor must recognize the fact that individuals do not learn until they are convinced that the effort is worth while. They will seldom learn simply because the instructor is ready to teach.

This implies that the instructor devote some thought to possible methods of preparing learners to receive his instruction. Since these methods have been discussed extensively in other study guides in this series, it will serve no useful purpose to repeat that discussion here. However, in order to refresh the instructor's memory, some suggestions are given below:

1. Introduce the lesson by means of questions which arouse interest.
2. Display an actual job, a chart containing a picture of a completed job, or a blackboard sketch. Ask questions about the job or explain the problem involved.
3. Describe a personal experience involving the ideas or skills which are to be presented to the learners.
4. Give an example of how the knowledge or skill will be of benefit to the learners in their present and future work.
5. Discover what the learners already know about the problem.

It should be emphasized here that *no new material* is introduced in the preparation step. The sole purpose of the step is to develop a state of readiness for the material which will be presented in the succeeding step. One of the most successful methods of accomplishing this purpose is the use of the question-and-answer procedure. By means of a series of carefully thought-out questions the learners are led from what they already know, as a result of previous experiences, to a desire to add to that knowledge. The example given below is typical of the manner in which the question-and-answer technique may be used to carry out the preparation step. In the lesson plan this material would follow immediately below the section devoted to equipment, tools, and materials.

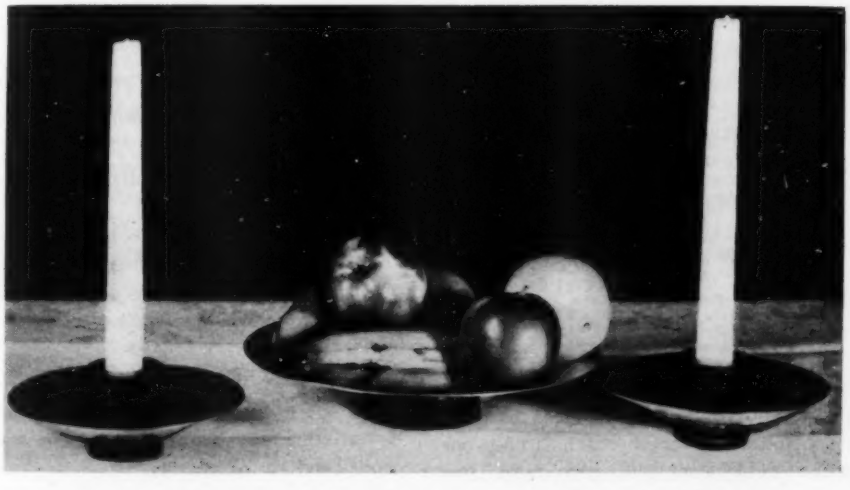
STEP I — PREPARING THE LEARNER ON INTRODUCING THE LESSON — Question-and-answer method

1. INSTRUCTOR: What will happen if an engine is operated without enough water in the cooling system, Jim?
   ANSWER: It will get too hot.
2. INSTRUCTOR: How do you remedy this situation, George?
   ANSWER: By putting in more water.
3. INSTRUCTOR: Suppose you pour in water that is too cold, or pour it too fast, Bill?
   ANSWER: It might crack the engine.
4. INSTRUCTOR: What part of the engine is most likely to crack, Tom?
   ANSWER: The cylinder head.
5. INSTRUCTOR: If the cylinder head cracks, is there any way of remedying it, Ed?
   ANSWER: You could weld the head or put on a new one.
6. INSTRUCTOR: That means the old head must be taken off, doesn't it, Jack?
   ANSWER: Yes, I guess it does.
7. INSTRUCTOR: Do you know how to take off the cylinder head and put it back, or put on a new one, Gene?
   ANSWER: I'm not sure.
8. INSTRUCTOR: I'm going to show all of you how to remove and install a cylinder head. Automobile mechanics do this job frequently. Watch closely so that you will be able to do it exactly as I do. That will keep you from having trouble when you do the job alone.

A trade technology instructor, in working out the preparation step for the technology lesson to accompany the manipulative lesson, might use the question-and-answer method, too. In that case his preparation step might proceed along the following lines:

STEP I — PREPARING THE LEARNER OR INTRODUCING THE LESSON — Question-and-answer method

1. INSTRUCTOR: Why does an engine have a removable cylinder head, Jim?
   ANSWER: So it can be taken off when work has to be done inside the engine.
2. INSTRUCTOR: Is there any other advantage in having a removable cylinder head, George?
   ANSWER: If the head wasn't removable it would take longer to repair the engine.



Projects made from articles in the December, 1950, and the January, 1951, issues of "Industrial Arts and Vocational Education," written by E. W. Manzer. The work was done by a student in the Prairie du Chien, Wis., High School, under the direction of Bert Krohn. The projects were made of aluminum and anodized a gold color

— Submitted by E. W. Manzer, State Teachers College, Platteville, Wis.

3. INSTRUCTOR: Do you know of another reason, Bill?
   ANSWER: If a head is cracked or warped it can be replaced or repaired without removing the entire cylinder block.
4. INSTRUCTOR: Why does it take more work to remove some cylinder heads than others, Tom?
   ANSWER: Because they are not all alike.
5. INSTRUCTOR: Why do you suppose cylinder heads aren't all made alike, Ed?
   ANSWER: I guess each automobile maker thinks his is the best.
6. INSTRUCTOR: Cylinder heads are designed differently for a number of reasons. Each maker designs his to suit his particular engine. If we take some time now to study how and why designs differ, we may be able to decide whether one is really better than another.

It will be observed that the instructor inserts in the lesson plan the answers he thinks will be given to the questions. It is impossible to anticipate the exact answers, of course, but if the instructor is careful in constructing his questions he will be able to control the answers to a surprising degree. Well thought out questions which are logically arranged will lead the learners from what they already know to what they do not know. By this time they usually have developed a desire to know; they are ready to learn.

In the space provided below, develop a set of questions which are suitable for the preparation step of the lesson plan you began organizing earlier in this study guide:

STEP I — PREPARING THE LEARNER OR INTRODUCING THE LESSON — Question-and-answer method

1. INSTRUCTOR:
   ANSWER:
2. INSTRUCTOR:
   ANSWER:
3. INSTRUCTOR:
   ANSWER:
4. INSTRUCTOR:
   ANSWER:
5. INSTRUCTOR:
   ANSWER:
6. INSTRUCTOR:
   ANSWER:
7. INSTRUCTOR:
   ANSWER:

It should be emphasized again that the question-and-answer approach is only one method of developing the preparation step of the lesson. There are, of course, other possible approaches. Instructors should master these other alternatives in order to avoid monotony in their lessons. Learners are quick to detect such monotony, and their interest will deteriorate correspondingly.

Step II — The presentation step. Allen, in his book titled *The Instructor, the Man and the Job,* refers to the completion of the preparation step as the jumping-off point. It is the point at which the instructor jumps off into the new material he wishes to present. Actually, in a skillfully taught lesson there is no noticeable break between the preparation steps. If the former step has been correctly handled the learners will have recalled things they learned previously, and they will be ready to add to these skills and knowledges. The instructor will then be able to take them into the presentation step smoothly, and with no loss of time, if he has carefully worked out this step in his lesson plan.

Ordinarily there are several methods which may be used in presenting new material. For the shop instructor, however, only one method is practicable. Since he is teaching skills to learners it is necessary to demonstrate these skills personally. This implies thinking through the various movements to be performed and then writing them into the lesson plan along with the key points which must be emphasized. The material presented below is an example of a presentation step in a manipulative lesson in the automotive trade.

STEP II — PRESENTATION STEP.
Tell, show, and ask questions.

Demonstration Steps

1. Drain cooling system and remove upper radiator hose and thermostat
   Save radiator solution if it contains antifreeze
2. Disconnect spark-plug wires and remove spark plugs
   Avoid breaking spark plugs when removing them from head
3. Remove cylinder-head bolts, and remove cylinder head and gasket
4. Clean machined surfaces of both the head and block, and inspect condition of surfaces and of gasket
5. Install new head gasket, and install cylinder head and bolts
   Bolt threads should be cleaned and oiled before installation
6. Tighten cylinder-head bolts according to plan in service manual, using torque wrench at the recommended tension
   Failure to follow recommendation may result in unsatisfactory performance
7. Install hose, thermostat, and radiator solution
8. Start engine, allow to warm up, recheck tension of head bolts, and adjust tappets to specified clearance
   Intake valves should be set .006 to .008 in. and exhaust .013 to .015 in., hot

In presenting the new material in the technology lesson the instructor has a choice of several methods. Since these methods, like those in the preparation step, have been explained in other study guides, no extended discussion will be offered here. It will serve the purpose merely to mention that the straight lecture method of presenting new material is probably the least effective. A much better technique is the question-and-answer approach featuring group discussion guided by the instructor. Even more desirable in certain situations is the use of instructional aids such as samples, mock-ups, charts, or film strips.

An example is presented below of the presentation step of an automotive technology lesson combining guided discussion with the use of a projector and a film strip:

STEP II — THE PRESENTATION STEP.
Show several different types of cylinder heads, present film strip, ask questions, and guide discussion regarding features of design and construction.

A. Discussion of the oustanding features of cylinder-head design
   1. Display several types of cylinder heads and point out common likenesses
      a) Water passages, bolt holes, spark plug holes, combustion chambers, and machined surfaces
   2. Call attention to outstanding differences
      a) Various forms of combustion chambers, presence or absence of valves and valve mechanism

B. Discussion of suitable cylinder-head materials
   1. Advantages and disadvantages of different kinds of material
      a) Cast iron
      b) *Aluminum*

C. Show film strip of Chevrolet or Buick cylinder head
   1. Call attention to various features and have individual members of group identify them

a) Material used, number of valve springs per cylinder, type of valve retainer and retainer lock

D. Summarize discussion of the major points of the lesson relative to cylinder-head features, likenesses and differences, kinds of material, advantages and disadvantages, and the important essentials of cylinder-head construction of the Chevrolet or Buick

1. Answer questions about any phases of the lesson that pupils do not fully understand

In the foregoing example of a presentation step involving the use of a film-strip projector it was not intended to imply that such a device must be used for all lessons. The instructor should select whatever instructional aids are best suited to the material he plans to present. The point to be remembered is the lessons are more effective when some type of instructional aid is used. Very few learners are able to visualize easily with only words to assist them. They acquire knowledge and skill more rapidly when they can see the things that are being discussed.

In the space which follows, write out the presentation step for either a manipulative or a technology lesson in your trade field:

STEP II —THE PRESENTATION STEP:

A. _____

_____

_____

B. _____

_____

_____

C. _____

_____

_____

Step III — The application step. If an instructor expects his learners to master a manipulative skill or retain needed information, he must plan situations which will permit them to apply what has been presented. The initial application, especially, should follow the presentation step as closely as possible. If the lesson has to do with a manipulative skill, the learners should immediately be given jobs requiring them to duplicate the skill which has just been demonstrated by the instructor. All the necessary tools, materials, and equipment must be available in order to avoid loss of time in starting work. In the case of a trade technology lesson it is equally essential for the learners to begin applying their newly gained knowledge. All references, catalogues, texts, and manuals, together with the required instruction sheets, should be at hand so that the learners can immediately proceed to the third step of the lesson.

Furthermore, while the application step is in progress, it is necessary for the instructor to supervise the work of the learners, to assist them with their difficulties, and to correct their mistakes. All this requires that the application step be planned in detail. An example is given below of the application step of an automotive manipulative lesson:

STEP III — APPLICATION STEP

1. Assign pupils, by teams of two, to previously selected engines, and require them to repeat operation which has just been demonstrated.
   a) Have each team draw necessary tool, equipment, and materials from toolroom.
   b) Supervise work in progress, moving from team to team, assisting, asking questions, or correcting errors in method
   c) Supervise work of other pupils who may be performing tasks not connected with the demonstration.

The application step of an automotive trade technology lesson will follow similar lines:

STEP III — APPLICATION STEP

1. Distribute assignment sheets and reference material, and require pupils to read and answer questions contained in the sheets.
2. Supervise pupils' work, moving from one to another, and assist when necessary.

In the space provided below work out the details of an application step for either a manipulative or a technology lesson in your trade field:

STEP III — APPLICATION STEP

1. _____

2. _____

3. _____

Step IV — The test step. Checking, testing, and follow-up is the purpose of the fourth and last step in the lesson plan. In this step the instructor determines how well the learners have mastered the content of the lesson, whether additional practice is necessary to bring them up to a desired level of proficiency, and what parts of the lesson may need to be retaught.

In the example which has been used throughout this guide the instructor might run the various engines and note their performance. He would, of course, take into consideration the amount of time the learners consumed in doing the work, whether they used the correct techniques, and how much skill they revealed in the process.

In the technology lesson the testing would ordinarily be much simpler. The instructor's inspection of the completed assignment sheets — if such were used — together with oral questioning or a written quiz would indicate the effectiveness of the learning.

In either lesson the results which are noted should provide valuable clues relative to the method of presentation which was used in the second step. The instructor may need to change his method the next time he teaches the lesson.

An example is given below of the test step in an automotive manipulative lesson:

STEP IV — TEST STEP

1. Inspect engine as each team completes assigned task
   a) If inspection reveals no indication of faulty workmanship, start engine and observe operation
   b) Ask questions to test understanding of reasons for procedure employed in performing task

The test step in the automotive technology lesson might be organized as follows:

STEP IV — TEST STEP

1. Inspect answers to questions on assignment sheets for this lesson, and make note of apparent difficulties
2. Reteach any phase of original lesson which learners do not seem to understand
3. Give oral or written quiz over all of lesson content

In the space provided below plan the test step in either a manipulative or a technology lesson in your trade field:

STEP IV — TEST STEP

1. _____
2. _____
3. _____

With the completion of the test step the lesson plan is ready for use. If it has been planned with care it will be a valuable instructional device and one which will help to insure effective teaching. As the instructor acquires experience in making and using lesson plans he will discover that his teaching is more enjoyable and his pupils learn more readily.

Straight Turning (Work Held in Chuck)

DESIRED RESULTS AND OBJECTIVES:

1. To teach the correct procedure in straight turning in a lathe when the work piece is held in a chuck
2. To teach the safe practices and work precautions which must be observed when straight turning

Equipment, Tools, and Materials:

1. 1-in. micrometer caliper
2. 8-in. outside caliper
3. 6-in. steel rule
4. Clean rag

STEP I — PREPARING THE LEARNER OR INTRODUCING THE LESSON —

Question-and-Answer Method — Not more than six pupils assembled at lathe

1. INSTRUCTOR: If a piece of round stock is too long to be used, how may it be brought down to the right length, Jim?
   ANSWER: By cutting it off.
2. INSTRUCTOR: What would you use to cut it off, Bob?
   ANSWER: A hack saw or a power saw.
3. INSTRUCTOR: Suppose a piece of round stock is too large in diameter, is there some way in which it may be brought down to size, George?
   ANSWER: I guess it could be cut, too.
4. INSTRUCTOR: Do you know the way to cut down the diameter of a piece of stock that is too large, Bill?
   ANSWER: No, I don't.
5. INSTRUCTOR: Since stock does not always come in exactly the diameter we need, I'm going to show you the correct way to cut it down to size. This is called straight turning; it is an important operation and one that a machinist does very frequently. Watch closely so you will be able to do it exactly as I do.

STEP II — PRESENTATION STEP — Tell, show, and ask questions

Demonstration Steps

1. Mount chuck
   Threads in chuck and on spindle must be clean and free from chips
2. Place work piece in chuck and tighten jaws
3. Center work piece in chuck by revolving chuck by hand and making necessary adjustments
   Either the chalk or the reversed toolholder method may be used
4. Insert correctly ground tool bit in toolholder and adjust to desired height
   The point of the tool should be approximately on center
5. Set depth of rough cut
6. Set outside calipers for diameter of the rough cut
7. Turn on power and engage longitudinal feed
8. Measure diameter of work piece after rough cut
   Calipers and steel rule should be used and machine should be stopped
9. Set depth of finishing cut
10. Engage power and take finishing cut
11. Measure diameter of work piece after finishing cut
    Measurement should be made with micrometer caliper after machine is shut off
12. Repeat Steps 9, 10, and 11 if necessary

STEP III — APPLICATION STEP

1. Give each pupil a piece of stock, assign to lathe, and have him repeat operation as nearly as possible in the way the instructor demonstrated
2. Supervise and assist pupils when they require it

STEP IV — TEST STEP

1. Check finished piece of each pupil for dimension and finish

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One pound of "activated alumina," an aluminum chemical frequently used as a drying agent, has an internal moisture-blotting surface equal to 30 football fields. — *Aluminum Company of America.*

Photography without a darkroom, that can be applied to the classroom, was a live demonstration by undergraduates Robert C. Purcell and Raymond J. Duffina, at the AVA Convention in Minneapolis

— Submitted by William J. Micheels, professor of industrial education, University of Minnesota, Minneapolis, Minn.

Four-Year College Mechanic Arts Curriculum

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Shortly following the termination of World War II the department of industrial education and art at the Kansas State Teachers College, Pittsburg, Kans., began receiving numerous letters inquiring into the possibilities of pursuing a college curriculum with specialization in one field of the industrial arts but not for the purpose of becoming a teacher. From the tone of the correspondence received it was apparent that here were a group of men who were interested in obtaining a college degree of a somewhat technical nature yet not a traditional engineering program.

Armed with such inquiries and requests, and with the support of college guidance personnel, boosters of such a program were able to evolve a curriculum that would appeal to such potential enrollees. The new degree was entitled Bachelor of Science in Mechanic Arts. The general education requirements are the same as for any other bachelor of science degree offered by the college. The major differences lie in the degree of spcialization in one area of industrial arts and the fact that students persuing this degree are not required to complete any of the education courses required of other students preparing to become teachers.

Areas of specialization in the mechanic arts degree are drafting, metalwork, printing, woodwork, and auto mechanics. The first three of these fields have had nearly all the enrollment to date. The four-year drafting curriculum, as shown, provides for 28 hours of classroom drafting, five hours of mathematics, ten hours of physics, and a variety of other professional and academic courses to give a well-rounded technical program. Other courses listed in the freshman and sophomore years are college requirements while those hours listed as elective throughout the four years are chosen from a variety of courses to meet the total general education requirements of the college. The metalwork area provides for approximately twenty-four hours of specialization, five hours of mathematics, ten hours of physics, twelve hours of drafting, plus other courses as listed in the drafting curriculum. The printing curriculum is quite similar to the others except that it provides for a longer major, 45 hours, and with fewer hours in physics and drawing. The woodworking and auto mechanics curriculums are also similar to those outlined except of course for the area of specialization.

Although the mechanic-arts degree was evolved at the request of older students, a number of younger students also have selected the program instead of the industrial arts curriculum. Should a student majoring in mechanic arts decide to change his program to a teaching degree he may do so. However, the nearer he is to completing his senior year the longer it will take him to meet the teaching requirements. For example, if a senior mechanic-arts student decides to change his curriculum, it would require approximately a year and a half to acquire the necessary education courses and other departmental requirements for the teaching degree. In one respect at least, this would produce a better teacher of industrial arts because of the greater number of shop hours accumulated in addition to the advantage of having had other related academic and professional courses not required for the teaching degree. However, from the student's point of view, five and one half years would probably be far too long a period to spend in acquiring a teaching certificate.

The innovation of the mechanic-arts degree and the success of the graduates has been highly gratifying to the college and in particular to the concerned members of the department of industrial education and art. Almost without exception the mechanics arts graduates have secured good beginning positions and have made better than average progress. Although such graduates are in great demand today they were equally successful in securing positions even before the Korean hostilities.

Thus it is felt that the mechanic-arts curriculum provides a type of technical-professional training that is definitely superior to the regular two-year technical program and in a good many respects is superior to a four-year engineering degree. Is it possible that more colleges should and could set up similar programs for students who are not interested in teaching or a theoretical engineering degree but yet could benefit from an applied technical program and the attendant benefits of a four-year college degree?

MECHANIC ARTS DRAFTING CURRICULUM

FRESHMAN YEAR

First Semester	*Sem. Hrs.*
General Drafting 4	2
Communication Skills 11	4
Personal and Com. Hygiene 7	3
College Algebra 15	3
Physical Education 1	1
*Electives	3
	16

Second Semester	*Sem. Hrs.*
Freehand 6	2
Communication Media 12	4
Patternmaking and Foundry 19	3
Plane Trigonometry 16	2
Physical Education 2	1
*Electives	4
	16

SOPHOMORE YEAR

First Semester	*Sem. Hrs.*
Descriptive Geometry 45	3
Machine Drawing 92	2
College Physics 50	5
Economics 60	3
Physical Education 51	1
*Electives	2
	16

Second Semester	*Sem. Hrs.*
Aircraft Drafting 57	2
Architectural Detailing 91	2
College Physics 51	5
Psychology 55	3
Physical Education 52	1
*Electives	3
	16

JUNIOR YEAR

First Semester	*Sem. Hrs.*
Machine Drawing and Design 117	2
Architectural Drawing and Design 141	2
Business Law 170	3
*Electives	8
	15

Second Semester	*Sem. Hrs.*
Machine Drawing and Design 192	2
Architectural Drawing and Design 191	2
Current Economic Problems 170	3
*Electives	8
	15

SENIOR YEAR

First Semester	*Sem. Hrs.*
Aviation Drafting 116	2
Furniture Design 190	3
Occupational Analysis 203	3
*Electives	7
	15

Second Semester	*Sem. Hrs.*
Industrial Illustration 193	2
Labor Problems 108	2
Personnel Management 206	3
*Electives	8
	15

Training High School Drawing Teachers

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Concepts Help Concerning Drawing

A drawing is what you have on paper when you have finished your thinking. Drawing is the language of engineers. Drawing is a language, but it is not a spoken language. These trite sayings are illustrative of the many with which you are familiar. However, in spite of the place of drawing in our industrial civilization and the fact that it is fairly well established as a subject in our secondary schools, a great variety of concepts exists concerning its place and function in the educational scheme.

Drawing an Essential Need

Drawing is taught quite generally in the high schools. School counselors are fairly well convinced that all students, irrespective of their future vocations, will be greatly benefited by instruction in the art of expressing ideas through the medium of a drawing. Nearly all people find it convenient, and sometimes essential, to read a working drawing.

For example, homemakers must plan their houses and arrange the landscaping; everyone is surrounded with machines and mechanical devices which are explained through various kinds of drawings; it is recognized that drawing is a basic tool for the engineer; technicians and skilled craftsmen must be able to read and interpret drawings in order to do their work intelligently. Recognizing this widespread need, there is general agreement among educators and lay people that drawing is an essential part of the education of an individual if he is to function well in this industrial age.

How to Read Versus How to Make a Working Drawing

If we accept the proposition that drafting is the language of industry, then all persons who are engaged in productive industry must be able to read and interpret working drawings. If ideas are to be transmitted to those engaged in productive industry through the media of drawing, then it is quite obvious that someone must produce the drawings.

High school mechanical drawing teachers have been in a dilemma for many years as to the best way to meet these two obvious needs or purposes which drawing in the high school should accomplish, namely, (1) to teach the student *how* to *read* and interpret the ideas expressed in a drawing, and (2) to make or produce a drawing which must be read by others.

Some drawing teachers have insisted that if a student is taught how to make working drawings, he will know how to read them. Other teachers have recognized the fact that there are large numbers of people who must use drawings; that is, they must get their information through their ability to read a drawing, but seldom find it necessary to make a drawing. Recognizing these two situations, we have seen a great variety of drawing courses developed in our high schools.

Specialized Drawing in Each Industry

Contributing to the confusion of teaching drawing in our high schools are the different practices and techniques used by different industries.

The machine tool industry, including the production of things made of metal, has led to the development of a highly specialized kind of drawing known as *detailing* and *machine tool designing*. The building

industry uses a type of drawing known as *architectural drawing*. The standards and conventions used by draftsmen in each of these two areas are very, very different. High school teachers have recognized these differences by establishing separate courses for architectural drawing and for machine tool and detail drawing.

It is unnecessary to continue the explanation of these differences except to point out that each of the subdivisions of the two big areas, namely, architectural and mechanical, have been further subdivided into furniture design, sheet-metal layout, patternmakers' layout, electrical and hydraulic lines, and the like.

Orthographic Projection Fundamental

Although the drawings produced for various industries appear to have highly specialized characteristics, high school drawing teachers have recognized that all drawing is based on a few fundamental principles.

Orthographic projection, for example, is just as fundamental in the architectural trades as it is in the machine tool industry. In recent years, several adaptations of mechanical perspective and pictorial drawings have been brought into use in making drawings for many industrial workers. However, such applications have not diminished the necessity to use and understand orthographic projection.

High school teachers have recognized that there are fundamental standards and conventions which underlie the making of all working drawings. This has led to the formation of beginning courses in drawing which introduce the student to a wide variety of applications of the basic principles. In these courses, attention is given to the techniques of drafting, including the selection of views dependent upon an understanding of orthographic projection; the use of variable line values, in order to express various aspects of shape and form; ways and means of dimensioning the object; ability to make the notes and figures necessary to fill out the information required.

Technique Emphasized Over Understanding

There is some evidence, however, that our high school drawing teachers have become too absorbed in their efforts to produce drawings which emphasize line values, lettering, and other aspects which are highly desirable in a good-looking drawing; so that they have neglected to emphasize the real purpose of drawing, namely, to express or transmit ideas. Finely formed arrowheads, sharp lines which show contrasting values, clear lettering, all artistically placed on a sheet of paper, are highly desirable; however, all of these may be obtained without any problems having been solved.

If we accept the concept, "A drawing is what you have on paper after you have completed your thinking," then a drawing must mean something else to a high school youngster than just an artistic assembly of lines and good lettering. It must represent ideas; a problem must have been attacked and solved.

The Interest Factor

Learning to control line values and other elements of artistic technique which are required of a draftsman in order to produce a fine drawing frequently require so much time and persistence on the part of the student that two things may happen: (1) the youngster gets completely sick of the whole business, and (2) he fails to comprehend that his drawing should be the tangible evidence of clear thinking and good planning.

Perhaps an analogy between reading and drawing is faulty. However, would it be reasonable to expect a high school student to acquire the ability to write descriptions or essays equal to his capacity to read descriptions and essays? In other words, young children learn to read literature far in advance of their ability to produce it. Why is it not equally reasonable to teach a student how to read blueprints far in advance of his ability to produce drawings?

Some Identifying Characteristics

The high school drawing teacher must have the background experiences to understand fully that a drawing is not an end in itself. It is only the means to an end: *to transmit ideas*. He must understand that only a small percentage of his students will become either draftsmen or engineers. He must recognize that, although some of his students may finally enter the engineering profession, or become draftsmen in any one of several industries, the training must be *general* not *specific* for any one occupational area.

If all the students in a high school were to receive instruction in drafting, less than 10 per cent would enter technical fields; the other 90 per cent would be *consumers* of drawing, not *producers*.

A good drawing teacher must be familiar with the basic tools and machines used in the manufacturing and the construction industries. In other words, if one sets out to become a good high school drawing teacher, he must have some practical knowledge concerning the use of the basic tools and materials of industry.

One very successful high school drawing teacher said, "Drawing should start with problems, not subjects." He meant that the drawing itself was secondary to the *problem* of construction or manufacture which the drawing was intended to solve.

The Student's Purpose

The high school drafting teacher should be continually aware that his students may:

1. Go to engineering college and use drawing as a supporting tool with which to do engineering work. Many young engineers start their careers on the drafting board, and when they serve in this capacity they are not working as engineers but as draftsmen.

2. Seek a job on a drafting board and become a draftsman. Many high schools have been successful in training students on the high school level for employment.

3. Go into the many diversified vocations, in which the drawing instruction they received in high school becomes just one of the many facets of a good, all-around education.

If these statements are true, then drawing teachers should refrain from too much specialization.

Sketching and Blueprint Reading

Freehand sketching of working drawings and blueprint reading, which involves visualization, taking off bills of material, and identifying tool operations, should, in the opinion of many, receive more attention by high school teachers. I am quite sure that, with well-developed teaching devices, students can be made familiar with a far wider scope of drawings than can possibly be done if the teaching is confined to the drawings that the student can make himself.

Pre-Engineering Drawing

Only the larger high schools will have enough students that they can assume

responsibility for teaching engineering drawing. There seems to be a great difference of opinion, anyway, among engineering colleges, concerning the desirability of high school teachers attempting to do this.

High schools, especially technical and trade high schools, provide the ideal place and time to give a boy the fundamentals of drafting, thus making him a *preferred apprentice* in any industry or business to learn the *trade*.

In terms of the contribution which the high schools can make of both engineering and trade drafting, only 20 per cent of all the boys in any high school will work at drafting. The high school drafting teacher, therefore, must attempt to serve the needs of all, not just the 20 per cent.

Professional Teacher Training

Teacher-training institutions have made major contributions in the field of professional education. Those drawing teachers who have had the advantage of training in educational psychology, methods of teaching, and the organization of instructional material have made major improvements in the art of teaching.

The teaching of drawing will be improved in direct relation to the professional training of the teachers assigned to the job. Therefore, whatever else is required in the training of drawing teachers, the profession of teaching requires specific training in the art of teaching. We must insist on teachers trained as professional teachers.

Professional teachers, however, must be masters of the subject. Very few teacher-training institutions have the facilities to train draftsmen. The skills and knowledges of the draftsman must be acquired in technical schools and on the job.

If we are to give attention to the training of future drawing teachers, two elements must receive equal emphasis: (1) training to teach, and (2) training as a draftsman.

Summary

1. The high school must determine the purposes of teaching drawing.
2. Then, and then only, can the training of future teachers be intelligently planned.
3. Once these determinations have been made, men well grounded in drafting can be trained as good teachers.

Leaders in Industrial Education

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(Continued from page 122 of the April, 1952, issue)

CHARLES ALLEN PROSSER

The unfolding of the events of the first quarter of this century in the educational world invites speculation as to the relative importance of a movement in producing a leader and of the leader in creating the movement. The movement for subsidized vocational education, which traces its origin to the early 1900's, was undoubtedly the most significant upheaval in the history of public education in the United States since the enactment of the land grant college legislation of the 1860's, and possibly since the founding of the public school system in the 1830's. In each case the achievement is associated with the career of an outstanding leader: in the 1830's, Horace Mann; in the 1860's, Senator Morrill; and in the 1900's, Dr. Prosser.

It seems certain that, if these three leaders, possessing as they did special qualities of vision, conviction, perseverance, and influence, had not arisen to prominence at these particular periods, the entire course of the history of education in America would have been different. On the other hand, it would be possible to support the view that, in each case, if the leader who actually headed the movement had not appeared, some other advocate would have come forward to take the reins, and might have been inspired to worthy achievement by the force of events.

An Outstanding Career

Of all the men and women who have achieved distinction in the development and promotion of vocational education in America since 1900, the one outstanding leader by general agreement is Charles A. Prosser. His remarkable endowment of talents and ability to use them, the intensity and effectiveness of his devotion to the cause which he espoused, the multitude of his achievements, the dynamic force of his personality, the uncounted honors and recognition accorded him, and the impact of his momentous career upon his day and generation, call for a full-length biography. The story must be written by someone who was closely associated with him in his varied activities, and over a long period of time. In fact, the preparation of an adequate and satisfactory account of Dr. Prosser's career requires the collaboration of several gifted contributors. While I am not equal to the demands of this larger assignment, I must include my impressions of Dr. Prosser in this series as my personal tribute to his eminence as an educator and leader, as an expression of my admiration for his qualities and achievements, and in memory of our friendship for more than 40 years.

The first significant aspect of Dr. Prosser's career to be noted was his almost meteoric initial rise to prominence as a leader. After leaving the superintendency of public schools in a relatively obscure small town of perhaps 15,000 population in southern Indiana, in a little more than four years he became known

from one end of the country to the other as the militant executive secretary of the National Society for the Promotion of Industrial Education, and a forceful advocate of a new movement in public education.

And the second notable fact is that, for a period of 35 years, from 1910 until his retirement from active duty in 1945, he was an effective and definitive influence in a multiplicity of organized activities, associations, commissions, boards, and enterprises, such as few educators of our generation have even approached.

Our First Meeting

My first meeting with Prosser was in Mobile, Ala., in February, 1911, at the convention of the Department of Superintendence (now the American Association of School Administrators) of the National Education Association. In the lobby of the headquarters hotel I was talking with the late Professor Selvidge, when he asked, "Have you met Prosser?" When I replied in the negative, he pointed out Prosser, who at the moment was the center of an animated group nearby. In a short time someone came along to take Selvidge to a committee meeting, and at about the same time the group with which Prosser had been talking broke up. I seized the opportunity, walked over, and introduced myself.

Prosser greeted me very cordially, and began by expressing his interest in the new magazine, *Vocational Education*, recently launched in Peoria, of which I was one of the editors. He expressed the opinion that the magazine could be especially helpful in view of certain developments then in prospect, and he proceeded to give me some of the details of plans for the future of the National Society for the Promotion of Industrial Education. These details were not ready for publication, but it was expected that within a few months it would be announced that funds had been provided with which to finance a notable expansion of the work of the Society, and a nationwide campaign of publicity and promotion. These plans came to fruition in due time, and will be discussed later.

Education

Charles Allen Prosser was born September 20, 1871, at New Albany, Ind., a town of about 15,000 population at that time, situated on the Ohio River opposite Louisville, Ky. Since his retirement from active service in 1945, he has made his home in Minneapolis.

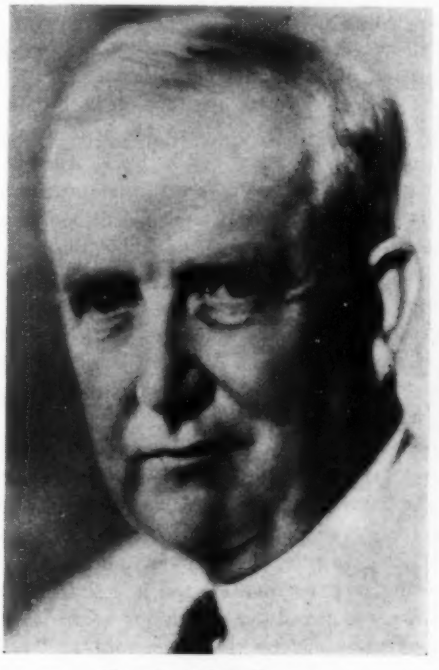
He received his early schooling in the elementary and high schools of New Albany, and is a graduate of DePauw University, Greencastle, Ind., where he received his B.S. degree in 1897; A.M. degree in 1906; and Ph.D. degree in 1915.

He studied law at the Law School of the University of Louisville, and received the LL.B. degree in 1898. This experience proved to be of the utmost significance to his future career, and to the progress of vocational education, for he subsequently exerted more influence upon the development and character of legislation for vocational education than any other leader in our history.

From 1908 to 1910, he was enrolled as a graduate student at Teachers College, Columbia University, New York, and, like many another graduate, he was drafted for important service before he had time to complete the work on his doctor's dissertation. But, unlike many another graduate, he later took the time to complete his dissertation in 1915, and was awarded the Ph.D. degree in June of that year.

His standing with faculty and fellow students is suggested by his election to Phi Beta Kappa, international scholastic honor society; Phi Delta Kappa, national honorary fraternity in education; Phi Delta Theta; and Iota Lambda Sigma, national honorary fraternity in industrial education.

Dr. Prosser was the recipient also of a number of honorary degrees, including: Hanover College, A.M., 1903; Alfred University, Alfred, N. Y., LL.D., 1919; The Stout Institute, Menomonie, Wis., D.Sc., 1925.



Charles Allen Prosser

His teaching experience began in the elementary school of New Albany, Ind., and as instructor of science and English literature in the high school. From 1900 to 1908, he was superintendent of schools in New Albany, from which position he resigned to enroll as a graduate student at Teachers College, New York. For one year, 1909–10, he was employed part time as superintendent and legal adviser of the Children's Aid Society in New York City.

To complete the chronology, he served for two years, 1910–12, as assistant commissioner for vocational education, State Department of Education, Boston, Mass. Then, for three years, 1912–15, he was executive secretary of the National Society for the Promotion of Industrial Education, with offices in New York City. From 1915 until his retirement from active duty in 1945 he was director of the William Hood Dunwoody Industrial Institute, Minneapolis, Minn. From 1917 to 1919, on leave of absence from Dunwoody Institute, he served as the first director of the Federal Board for Vocational Education, Washington, D. C.

Interest in Vocational Education

Beginning in the fall of 1910, Prosser served two years as assistant commissioner in charge of vocational education in the

State Department of Education, Boston, Mass. It will be recalled that the first state law providing financial aid to communities for the establishment and maintenance of industrial schools was enacted in Massachusetts in 1902. Dr. David Snedden left his post at Teachers College to accept appointment as state commissioner of education in Massachusetts in 1909, and notable developments began almost immediately. The number of communities planning to avail themselves of the provisions of the law, and seeking guidance and assistance in the formulation of courses of study, selection of teachers, and other details was increasing rapidly, and the need for a technical staff to deal with these problems was imperative. Prosser had been a student in Dr. Snedden's classes at Teachers College, where he made such a strong impression that he was called to Boston to organize the new division of vocational education.

The choice was a fortunate one, and Prosser took hold with great enthusiasm and energy. One of his first important moves was to call for the appointment of Charles R. Allen as his assistant. Allen had developed one of the earliest programs of industrial education in Massachusetts, and had demonstrated a grasp of the administrative and technical details that few men had had opportunity to acquire at that early period. Working together, Prosser and Allen formed a team that commanded the respect and admiration of the country for their achievements during these two critical years. Although Dr. Prosser left Boston in 1912, the two men collaborated in numerous significant undertakings in subsequent years.

As a sidelight on their teamwork in Massachusetts, it is related that on one occasion Dr. Prosser responded to an urgent call to meet with the members of the school committee, and representatives of employers and workers, in a city that was contemplating the introduction of a program of trade training. Two days were spent in looking over the situation and in a series of conferences, at which Prosser outlined the provisions of the law, discussed the conditions to be met by the community, and explained the objectives and advantages of industrial education. Toward the end of the second day, the members of the school committee began asking questions concerning details of just what to do and how to do it. That evening Prosser announced that he had received a long-distance call that would require his return to Boston; but, he would send his assistant who was fully qualified to take up with the superintendent and the committee all the necessary details. Two days later, Mr. Allen appeared on the scene to help get the program started. It is said that something like this happened on several occasions.

Of course, this story may be apocryphal, although it was given to me more than 30 years ago by two different leaders in the Massachusetts schools of that period, who worked with Prosser and Allen during those eventful years. In any event, it is a good story, and illustrates admirably the attitude of co-operation, and the ability to organize and lead in teamwork, which Dr. Prosser exemplified to a remarkable degree.

Secretary of the National Society

As related previously, public interest in the necessity for more and better training of skilled workers for the manufacturing and mechanical trades began to make itself felt in the early 1900's. Great impetus was given to the discussion by the reports, in 1906 and 1908, published by the two industrial education commissions appointed by Governor William L. Douglas, of Massachusetts. The first of these reports led directly to the holding of a meeting in June, 1906, which was followed by a larger meeting (of more than 250 persons) in November of that year, at which it was decided to organize the National Society for the Promotion of Industrial Education. The Society held its first convention at the Auditorium Hotel and the Art Institute, in Chicago, in January, 1908.

Although there were important centers of influence in the middle west, and in the far west, the greatest concentration of leadership and potential action, at least for nearly a decade following 1906, was in the region east of the Allegheny Mountains and north of the Potomac River. Here were important manufacturing and commercial centers, and even more important, considerable numbers of manufacturing, business, and civic leaders who were vitally concerned with the necessity of increasing the supply of skilled workers, and improvement of the design, quantity, and quality of manufactured products, to meet the threat of foreign competitors, and who were ready and willing to provide the necessary funds to get something done.

Shortly after the National Society was organized, a movement was begun to enlist the active financial support of manufacturers, capitalists, and others. Subscriptions were sought and secured, several of which amounted to $1,000 a year. Sufficient funds were secured to underwrite a substantial budget for a period of five years, and plans were laid for a vigorous campaign of publicity and promotion.

To direct this campaign called for someone with an unusual combination of leadership and promotional qualities, and it was promptly decided that Prosser was the man for the job. Taking up his new duties as executive secretary of the National Society early in 1912, one of his first assignments was to go to Washington, in March of that year, to assist in the revision and strengthening of a federal bill dealing with vocational education, which Senator Carroll S. Page introduced in the Senate.[1] With his background of training in the Law School, he had made a thorough study of vocational education legislation in Massachusetts, and in other states in the northeast which had enacted similar laws. Consequently he was well prepared to launch upon a study of federal legislation.

Promotional Activities

As soon as it became known that Dr. Prosser was available for speaking engagements, conferences on state legislation, and other major problems of a new and rapidly expanding program, there began what might almost be described as a whirlwind tour of the country, chiefly in the eastern and midwestern sections. He took the lead in formulating a statement of *Principles and Policies* in vocational education which was discussed at the Philadelphia meeting of the National Society in December, 1912, approved by the executive committee, printed as a bulletin, and widely distributed. "In promoting the principles and policies in this statement, Dr. Prosser went from state to state as needed to help in shaping legislation, and through his legal knowledge, experience in Massachusetts, enthusiasm for vocational education, and exceptional ability as a public speaker, wielded a great influence upon legislative bodies."[2]

[1]Charles A. Bennett, *History of Manual and Industrial Education, 1870 to 1917* (Peoria, Ill.: The Manual Arts Press, 1937), p. 546.
[2]Charles A. Bennett, *op. cit.*, p. 546.

One feature of Dr. Prosser's tours through the middle west, especially his first trip in the spring of 1912, provoked considerable criticism.

From September, 1910, to July, 1912, I served as assistant dean of the College of Engineering of the University of Illinois. Early in January, 1912, I learned that Dr. Prosser was contemplating a tour through the middle west, and wrote to inquire about the possibility of a visit to the University of Illinois, and an address on some phase of vocational education. He replied that he would be glad to accept, and set a tentative date in April, to be confirmed as soon as he could complete his itinerary.

I immediately went to work on plans for a luncheon at the Faculty Club, and talked with my dean, W. F. M. Goss, of the College of Engineering; Dr. William C. Bagley, dean of the College of Education; Eugene C. Davenport, dean of the College of Agriculture; the deans of the College of Science, and the College of Commerce, whose names I do not now recall; and President Edmund J. James. I also called upon or wrote letters to the superintendents of schools, principals of high schools, and county superintendents within fifty miles or so of Urbana.

When the time came for the luncheon we had assembled a rather unusual audience of 75 or 80 prominent men and women. Dr. Prosser made an eloquent address on the need of federal legislation to aid the states in promoting the various types of vocational education, which he discussed at some length. As might be expected, this part of his address made an excellent impression on such an audience, assembled on the campus of one of the great land-grant colleges of the country.

During the course of his remarks, to my astonishment, he paid his respects to "manual training" in language such as I had never heard or read from our severest critics up to that time. Although we had been trying for several years to secure acceptance of the new term, "industrial arts," and with it certain new concepts with reference to objectives, courses of study, and methods of teaching, all this was ignored.

Dr. Prosser warned his hearers that they must not confuse the new "real" vocational education with the old "fossilized" or "wooden" manual training (in his enthusiasms his metaphors became slightly mixed) that was being taught in so many high schools. He insisted that the only thing to do with manual training was to junk it, to eliminate it from the schools, and to concentrate on a program of industrial education that alone held out some promise of useful service to boys and girls.

Later I learned that Dr. Prosser had made similar addresses elsewhere in Indiana, Illinois, and other neighboring states, and that his criticisms of "manual training" had not been well received. I remember that shortly after his appearance at the University of Illinois he paid a visit to Bradley Polytechnic Institute, now Bradley University, in Peoria. Mr. Bennett told me later of his personally conducting Prosser around through the institution, and of endeavoring to interest him in the activities of the various shops and drafting rooms. "I found it difficult to get him to see the things I wanted him to see. He showed very little interest in or comprehension of anything we were doing. After a while we came to the School of Horology, where young men and women were in training to become repairers of clocks and watches, engravers, and so on. Here he brightened up perceptibly, and exclaimed: 'Now, here is some real vocational education!' "

I remember talking with the superintendent of schools of one of the larger cities, who said: "He came out to our state teachers convention to talk about vocational education, and took a good part of his time to criticize what he called 'manual training.' He didn't do his vocational education cause much good because of what he said about manual training. The kind of manual training he talked about we discarded in our schools years ago. We do not even use that term any more."

(To be continued)

Professional Organization Field Chapter Activities

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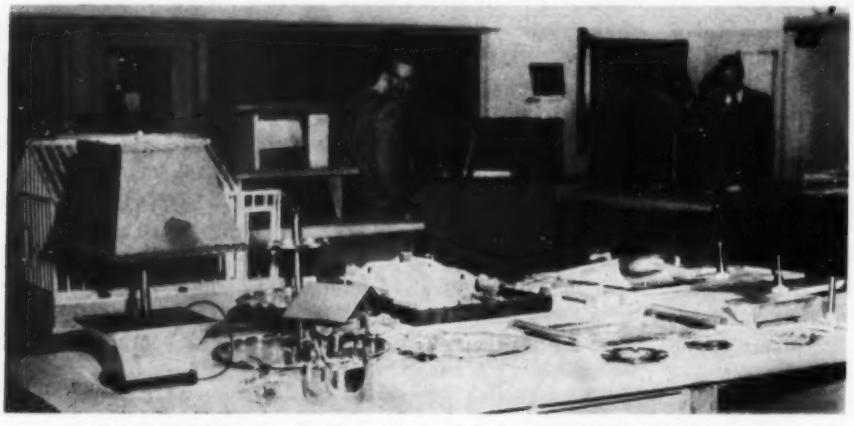
For several years Alpha Field Chapter of Epsilon Pi Tau has carried on a program of activities designed to stimulate a professional outlook and an improvement of teaching methods and techniques in industrial arts and vocational education.

One of the high lights of the field chapter's activities is the Beginning Teacher's Clinic for teachers in the Los Angeles city and county area. This meeting is open to all teachers whether or not they are members of the fraternity. Organization of the clinic has been a responsibility of our trustee Claude E. Nihart working in conjunction with the executive committee of the field chapter.

The Beginning Teacher's Clinic is carried on in the following manner. A date is set for about the fifth week of school. The clinic is opened with a short introductory or inspirational talk followed by the in-

troduction of a panel of experts made up of ten or twelve master teachers from all fields who actually conduct the clinic. This has been done in two ways. One method is to have a panel discussion before the entire group of beginning teachers on various problems common to the opening of school. Questions from the new teachers in the audience are answered by different members of the panel thus giving more than one method on how to handle a particular situation. The other method used is to have an opening talk by a supervisor of teachers to the entire group and then break up into smaller group meetings headed by a chairman and several experienced teachers in specific fields such as wood, metal, electricity, etc. The beginning teachers gather around the conference table discussing problems peculiar to their own field. Discussions seldom lag as the experienced teachers freely relate their own problems which in turn encourages the new teacher to *open up* and ask for help. Whether in a large group of the whole discussion, or in smaller groups in special fields the meetings never close early but often go overtime as the interesting discussion of teaching problems goes on. All participants, including both beginning and experienced teachers leave this meeting with new ideas, inspiration, and determination to do a better job.

Dr. William E. Warner, founder of Epsilon Pi Tau, addressing Alpha Field Chapter at Founder's Day Banquet



Close-up of some entries in the Project and Teaching Aid Contest

Alpha Field Chapter is considering changing the title of next year's clinic from, "Beginning Teacher's Clinic" to "Teacher's Clinic" with a special invitation to beginning teachers. This proposed change is the result of interest shown by experienced teachers on the panel. They feel that other "old dogs" in industrial arts would also like to learn and exchange "new tricks" with members of their profession.

Other activities that the Los Angeles Field Chapter traditionally carry on are as follows: The first meeting of the school year is a fellowship meeting, a free dinner, a speaker, and visitation of a modern school shop. Next a business meeting is held to elect new officers, and as at other meetings, includes a school shop visit. An added feature of this meeting is a panel discussion on industrial education with supervisors, teachers, teacher training educators, and industrialists participating.

The third meeting held just before the close of the first semester is known as the project and teaching-aid meeting. Each member brings a new project or teaching aid designed for school use. A group of judges select the best projects and teaching aids in each field. Projects are judged on workmanship and design with special emphasis on suitability for school shop use. Winners receive appropriate prizes.

A major event of the fraternity year is our founder's day banquet. To this meeting members bring their school administrators as guests. A top notch speaker, installation of new officers, and presentation of Epsilon Pi Tau awards and citations are program features. In 1950 we were especially honored by having as our founder's day speaker, Dr. William E. Warner, executive secretary of the Epsilon Pi Tau and founder of the fraternity. Dr. Warner was greeted by a record turn out of teachers, supervisors, high school principals, city superintendents, and others interested in industrial education.

When field chapters were first organized it was feared their activities might conflict with those of campus chapters. These fears have since been allayed since instead of weakening campus chapters it has stimulated campus activities. One evidence of co-operation between campus and field chapter is the annual presentation of the Epsilon Pi Tau Award by the Alpha Field Chapter to the outstanding industrial-arts graduate from the University of California, Santa Barbara College.

Field chapter efforts are not limited to benefit of membership alone but to the professional growth of all teachers. The growth and development of Alpha Field Chapter has encouraged Epsilon Pi Tau members in other areas to organize field chapters. Since the installation of Alpha Field Chapter in 1947, the San Diego Area has organized Beta Field Chapter, the San Francisco Bay Area, the Delta Field Chapter, and the Phoenix, Arizona executive committee of the field chapter.

Industrial Arts and Vocational Education

John J. Metz, *Editor*

THAT DREADED FIRST DAY

Most young graduates of industrial education courses look forward to their first day of actual teaching duty with misgivings if not with fear.

Many of them, no doubt, have done some practice teaching, but the ordeal of the first day is something different, since it is shrouded in the mist of the unknown. The beginner, however, need have no fears since it is no worse than a super end-of-the-year test, of which he, no doubt, has had a great many.

There are things, however, for which the beginner should prepare himself and his classroom so that the students who meet him for the first time will get a favorable impression that will help him and them for the best interests of both. Above all, he should remember that he is entering a most worth-while profession. He should not forget for one instant that he has an opportunity to affect the lives of his students in a most direct manner. He has in his power the opportunity to establish the best type of public relations right from the start. He can set up conditions which will help his students acquire proper work habits, acquire worthwhile skills, get the right idea of what the school is trying to do for him and his fellow students, and obtain a good perspective of student-teacher relations.

To do this he must be prepared to set a good example for these young strangers who know nothing about him and little about the subject which they are about to take up. His room must give them a realization of what orderly arrangement and procedure means. His attitude toward them must invite friendly co-operation because without their help he will fail to accomplish that for which he has been hired — to help them and to become a successful teacher.

Above all, he must try hard not to permit himself to look upon them as beings of little or no value. He will find that some of them are quite intelligent while others have IQ's that, unfortunately, foreshadow a future that is not so promising. This very fact will give him a picture of his real job. He must help the bright students acquire as much skill and technical knowledge as possible, and he must instill the will and energy into his less favored pupils to work hard to get as much out of their schoolwork as they can so that they are better fitted for entry into business or industry.

The so-called dumbbells (a term that ought never be used to designate a pupil in your classes) may seem hopeless to you, and yet some of them in later years may be holding jobs of trust that are as important to their employers, families, and communities as those held by the brighter boys.

A real interest and an earnest endeavor to help these low IQ students will pay off in real satisfaction to the teacher who is willing to meet them with kind sympathy and to expend the extra energy which these cases require.

STARTLING FACTS

With the opening of the new school year, it is proper that the school-shop teacher should think carefully about the safety conditions in his shop, and the manner in which he is planning to teach the subject of safety in the coming year.

A release issued recently by the National Safety Council sets forth some information that is of special importance to those who are training the future industrial workers of our country. The release says that a man working five days a week for the next million years could not make up the lost time resulting from 1951's work accidents.

The total cost of the 1951 occupational injuries amounted to $2,650,000,000. This enormous money loss does not take into account the hours of pain and anxiety spent by the injured man and his family. It does not take into account the sleepless nights passed, not only in physical pain, but in hopeless contemplation of what might be.

The 280,000,000 man-days of lost labor present but one side of the picture, and to think that the industrial arts and vocational education teachers have it in their power to influence the frightful annual loss caused by industrial accidents presents both a frightening thought and an encouraging challenge.

Look over your safety outline. It may need a brushing up.

INTERESTING INFORMATION

Petroleum products are used more and more and the students of many school shops will be interested in the following items that were reported in one of the earlier *Petroleum News Notes.*

The steel drill pipe used for drilling the modern oil wells must be made of extremely tough steel to withstand the several twists a long string of drill pipe takes at the top before the bottom begins to turn.

The weight of such a drill pipe in a deep well may run up to 125 tons and over.

The oil industry is now reactivating old oil wells that were thought to have yielded their last recoverable drop of crude petroleum.

This is accomplished by pumping water under pressure into the old wells. By this method, some of the old wells produce from 25 to 300 per cent more crude oil than they did originally.

The oil industry also is succeeding in producing much of the iodine used annually in the United States. This chemical is obtained from the brine that comes up with the oil from some producing wells. The supply from Louisiana and the West Coast furnishes the iodine in such large quantities that foreign imports of this chemical could be cut down considerably.

REARRANGING YOUR SHOP

Are you planning to rearrange your shop at some time during the school year just about to start? If so, the following articles in past issues of our magazine may help you.

"Planning the Comprehensive General Shop," page 88, March, 1951.

"Some Thoughts Relative to Shop Planning," page 97, March, 1951.

"Toolholders — Their Design, Construction, and Location on the Tool Panel," page 120, March, 1951.

"A Practical Small General Shop," page 79, March, 1952 .

"A Composite Industrial-Arts Shop," page 80, March, 1952.

"School Shop Planning With 3-Dimensional Scale Models," page 85, Mar., 1952.

"Lighting the Industrial-Arts Laboratory," page 90, March, 1952.

"The Psychological Effects of Color Dynamics," page 103, March, 1952.

Techniques of Preparing, Giving, and Scoring a Written Trade Test

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Measurement in its various forms and phases is encountered endlessly in our daily lives. It is recognized as a necessary factor in order to give us a common denominator in all the various channels of endeavor with which we may be associated.

When milk is delivered to our door in the morning we know it meets certain specifications established as safeguards to our health and well-being. When we stop for gasoline on our way to work we know each quality gasoline has a certain specified octane rating.

Likewise, human endeavor also has its norms, such as the qualifying examinations given to doctors, lawyers, architects.

The development of tests and measurements in the trades and industries has, however, been slower than in other fields. Consequently, the standards of accomplishment in a number of trades are not at all clear.

With the co-operation of management and labor, the Los Angeles City School system has initiated a program to set up technical measurements in various trades. At present technical (written) tests have been completed for plastering, carpentry, cabinetmaking and millwork, sheet metal, electricity, and meat cutting.

The preparation of one of these tests (cabinetmaking) and how it is administered and graded is described in the following paragraphs.

Scope of Testing

There are at least five factors on which data should be secured when evaluating an apprentice for promotion to the journeyman level, or when judging his progress before promoting him to the next step of the apprenticeship period.

1. *Length of the apprenticeship period.* Length of the apprenticeship period is stated in the apprenticeship contract. This varies from three to five years. Four years is probably the average.

2. *Employer rating.* This is probably one of the strongest factors listed and is often made by the foreman.

3. *School instructor rating.* This is quite important as positive evidence can be secured regarding interest in schoolwork and ability to acquire technical knowledge. (School attendance is a requirement of the California Apprenticeship Law.)

4. *Performance test.* In this test the apprentice does an actual job using the tools of the trade. This test is easy to prepare but hard to administer because a shop is required in which the test can be administered; test supplies must be provided, and money must be raised to pay for all of this. If a performance test is not given the employer's rating should provide evidence of craft skill.

NOTE: It should be emphasized that the performance test is a device par excellent when measuring craftsmanship ability, and for this reason such a test should always be given if it is at all feasible. Technical knowledge, however, must *also* be measured, and for this purpose a written test must be planned. The emphasis in this article is on the written test.

5. *A written test.* This test covers the technical phases of the trade. It takes considerable time to prepare but is easy to administer as a large classroom with suitable tables and chairs is all that is required.

The technical topics covered cannot be easily learned on the job (although there are daily opportunities to *use* the knowledge) but must be learned in the classroom. A written test will give evidence of an apprentice's understanding of the how and why of the job.

Preparing a Trade Test

Obviously, a trade test should not be prepared unless an apprenticeship committee realizes the need for one, otherwise it would not be used. Assuming that a trade test is requested how does one proceed? Cabinetmaking will be used to illustrate the procedures.

1. Almost the last thing to do is write the questions, although many think this should be done first.

2. The job is greatly simplified if an experienced vocational instructor is asked to assist in the test preparation as he will have already prepared (for teaching purposes) an analysis of his trade and this same analysis can serve as the basis for the test content. In any event a test outline should be prepared first.

Steps in making a test outline

a) List the various trade divisions and subdivisions to be covered in the test, and get committee approval on these units. This is very important. Using our example of cabinetmaking the following eight divisions were listed: *technical, manufactured products, installation, hand tools, veneers and veneering, safety practices, machine operation,* and *identification.*

b) List subdivisions for each major division.

c) Make a tentative *mathematical evaluation* of each division in relationship to all other divisions.

NOTE: *This step is the key to securing a balanced test.* Certainly one division or subdivision should not be emphasized to such a degree that another division must, due to the time element, receive less emphasis than it should. For example: it seems logical that *hand tools* would require less coverage than *machine operation;* and *installation* would require fewer questions than *manufactured products.* The test maker should ask his committee this

question: "If we have 100 per cent to allot to the entire examination, what percentage should be allotted each division?" A little trial and error work will set up a fair value for each division.

The length of the test must not be forgotten. Experience has proved that from 250 to 275 questions is enough for a trade test. This number of questions will take from two and one half hours for the fast apprentice to four hours for the slower one to complete.

d) Now prepare the questions* allowing one question per evaluation point. A division evaluation of 25 points would require 25 questions, one point per question. The accuracy of *weights per division* now shows up. If more pertinent questions than the percentage allotted per division can be thought up then *increase* the total weight given to that division. Likewise if the test writer runs dry before reaching the weight value set for a certain division, then reduce the weight for that division.

Continue this process of writing and reweighting until all questions are written and all blocks reweighted according to actual question content. It might prove that one or two divisions could be combined. The aim is to secure a *balanced test* with proper emphasis on all trade divisions. This is the reason why questions should not be written until the blocks or divisions are weighted correctly.

Type of Questions

The questions in a trade test can be of several different types, such as essay, true and false, matching, completion, multiple choice, and identification. For a trade test the multiple choice and identification type questions have proved to be the best from the viewpoint of time and ease of scoring.

The identification questions are prepared by selecting suitable illustrations covering tools, methods, and machines. Drawings are made to show joints, cuts, and types of construction. A plan of a simple cabinet is excellent for identifying parts of a blueprint. Lumber is best identified by using actual lumber samples which should be planed thin and glued on both sides of a single piece of stock, thus eliminating the handling of several pieces of wood. The length of each sample need not exceed 6 in.

*The pamphlet "How to Make and Use Objectives Tests" by E. C. Estabrooke gives an excellent description of various types of questions. Publisher — National Home Study Council, Washington 6, D. C.

After all questions have been prepared they should be carefully edited by a committee of expert craftsmen. This procedure eliminates any complaints as it authenticates the entire test, giving it *trade standing*.

Organization of the Test Into Booklets

After the written questions and identification illustrations are completed and approved the test is then ready for assembly into three booklets namely:

1. Personal information booklet
2. Question booklet
3. Answer booklet

Personal information booklet consists of two pages on which the apprentice fills in information covering his address, employment status, attendance at school, and employment field or fields. For most trades there is only *one* employment field. Cabinetmaking has so many different occupational fields it was necessary to plan these five divisions. The test for a trade with only one field is much easier to prepare; hence, no description will be given on the five-field type of test.

The *self-evaluation sheet* enables an apprentice to give a self-appraisal of his ability in the trade. Note that the items on this sheet are the same as on the original test outline on which the test was constructed but they have been rearranged for rating.

A comparison of this self-rating checks with the test score often results in an apprentice willingly continuing his school studies of those units in which the test grade definitely indicated he needed more training.

The question booklet consists of all written questions, which should be numbered consecutively without reference to the test divisions. Identification units are best numbered separately such as lumber 1, 2, 3, etc.; hardware 1, 2, 3; and machines 1, 2, 3, etc.

The answer booklet consists of several sheets specially ruled and co-ordinated with each type of question. For the multiple choice questions four squares are ruled per question; the candidate makes an X in the proper square. For the mathematical problems a rectangle is made to receive the answer.

In a few cases actual drawings are made on the answer sheet for the apprentice to read and identify certain parts. Extreme care must be used to lay out the answer squares to permit recording the answer clearly. Hence answer sheets are not made until the test is completed.

List of words representing various tool and machine illustrations, abbreviations, joints, lumber, etc., are included in the answer booklet. The apprentice matches each word with the corresponding picture in the identification section of the test.

Authenticating the Test

The test is authenticated by giving it to a group of unselected journeymen. The passing score for each test division is determined on the basis of the journeymen scores. It should not be overlooked that journeymen possess much more trade experience than the apprentice but may lack in ability to pass a written examination. Hence the standards of accomplishment, as measured by a written test, should be made even higher than the journeymen grades if skilled craftsmen are to be obtained through the apprenticeship system.

Giving the Test

Time and place. A well-lighted quiet room should be secured with suitable table and chairs so arranged that the apprentices do not sit too close to one another. A small assembly room in a public school is ideal. A little time should be allowed for tardiness; say fifteen minutes. In fairness to those present the doors should then be closed and the examination started without interruption.

Saturday mornings are recommended as the best time to give the test in preference to evenings due to the fatigue factor. School authorities should be contacted if a classroom is desired.

It is advantageous to the committee if the starting and finishing time of each apprentice is recorded on his sheet although no time limit need be set on the test. This information should *not* be used when grading the paper but is helpful in determining the time length of the test to be sure it is not too long.

Numbering the question booklets. Question booklets should be numbered consecutively and an accurate count made *at the start* and *at the close* of an examination to be sure no booklets have been lost.

Pencils and rules. Examiner should have a supply on hand; some apprentices will forget theirs.

Enrollment sheet. Prepare an enrollment sheet numbered consecutively 1, 2, 3, etc.

Then assign a test numbered the same as the one corresponding with the apprentice's registration number. This permits an easy check at the close of the examination.

Information sheet. Pass out the information sheet as soon as each apprentice arrives and have him fill in all required information. This information is very valuable for the apprentice committee when they evaluate each apprentice in terms of his employment status, school record, etc.

Examiner's instructions. The examiner should inform the apprentice that:

a) The test has been carefully prepared by expert craftsmen.

b) There are no *trick* questions.

c) Most questions are multiple choice or identification excepting a few math and drawing problems.

d) Answers are recorded by simply making an X in the proper column on the answer sheets.

e) The apprentice should flag the examiner if he needs information. One factor in giving a test is to see that the room is kept quiet so that each apprentice can concentrate without interruption.

f) Indicate that *no marks are to be made on the question booklet;* all figuring is to be done on the back of the answer sheets.

Examiner's procedures. The examiner now passes out the question and answer booklets. Be sure that each apprentice writes his test number (should be the same as his registration number, if possible) and his name and address on the answer booklet. This is the only means of identification on the booklet. If his name is omitted, then no grade can be turned in.

As each apprentice completes his examination require him to report to the examiner's desk and check the question and answer booklets against his name. He should then be permitted to leave the room.

Grading the Test

The grading is simplified by making a score key. This is done by pasting an answer sheet onto a stiff card; mark the correct answer for each question; and then punch out the correct answers. The result is a perforated sheet to be placed over the answer sheets. The checker makes an *X* with a red pencil through any hole in which no marks are showing. For the mathematical answers a *window* is cut in the score key sheet and the correct answers placed on one edge of the opening. These answers can then be quickly matched with the test paper.

An apprentice should be required to pass *each* test division, hence no total passing score is established. This prevents an apprentice, who may be strong in one division and weak in another, from building up a high total passing score. The effectiveness of a balanced test is lost unless passing scores are required for each test division.

One point is allowed per question.

Report Card

The report card is quite simple with several columns which indicate number of questions passed; total questions passed; score required to pass and score made.

Committee Procedure in Evaluating the Test Score

The report card is attached to the personal information sheet and sent to the apprenticeship committee. Each apprentice should appear before the committee for an oral interview. At this time all data is assembled, to wit: trade experience record, employer rating, school record, self-evaluation sheet, and the test grade. On the basis of this information it is not difficult for the committee to make a very objective decision regarding the promotion of an apprentice to journeyman status. If an apprentice fails in any trade division he should be asked to return to school to secure more training in that particular unit of work.

Summary

The procedure just outlined takes considerable time when preparing a technical or written trade test. However, the results are most gratifying. The following items should be kept in mind.

1. Weighting of blocks or divisions
2. Careful preparation of questions
3. Careful editing of all questions by trade experts
4. Preparation of the personal information sheets; the question booklet and the answer booklet
5. Preparation of the answer key to exactly match the answer sheets
6. Preparing a score key so it can be done quickly and easily

PUBLIC RELATIONS

We hear a lot these days about public relations. It has been said that much of the recent criticism of our schools is the result of poor publicity. This may be partially true.

Let's face it. The average citizen does not know of the good things that are going on in our classrooms, laboratories, and shops and it is partly our fault. What can the industrial arts and vocational teachers do to remedy this situation? Here are a few suggestions:

1. Display students' work in school exhibits.
2. Co-operate with service groups in promoting competitive award programs.
3. Encourage students to enter National Awards Project Competition.
4. Keep a clean, attractive, and well-organized shop — a cheerful environment in which to work.
5. Hold up high standards of craftsmanship.
6. Well-designed and constructed projects taken home will sell parents on industrial arts and vocational programs.
7. Hold "open house" with all shops in operation and distribute leaflets explaining the organization and purposes of industrial education.
8. Invite fellow faculty members and administrators to visit the shops.
9. Publicize the activities of the shop program in school and public press.

Probably the most important factor in improving public relations is what goes on daily in shop classes. A friendly and understanding attitude of the teacher toward students; a well-planned instruction program; a functional student-control organization; high quality of craftsmanship; and the development of good work habits are things that parents are certain to hear about. — CLAUDE E. NIHART, *Shop News,* Jan. 21, 1952 Edition.

Synthetic rubber made with petroleum derivatives is now produced in liquid form. It can be applied like paint to steel, wood, or concrete with a brush or spray gun. An elastic non-cracking neoprene coating, it dries rapidly and is resistant to weather, oil, grease, or chemicals. — *Petroleum Newsnotes.*

During the year 16,687 persons were given emergency care by operators of 2100 Red Cross first aid highway stations and 12,000 first aid mobile units. — *American National Red Cross.*

Over 89,000 elementary and secondary schools were enrolled in the Junior Red Cross during the last fiscal year. Junior members sent 280,000 gift boxes, 380 school chests, 750 school correspondence albums, and nearly 5,000 paintings to children overseas. All Junior Red Cross international shipments during 1950–51 were valued at $1,014,310. — *American National Red Cross.*

PROBLEMS AND PROJECTS

CORNER CUPBOARD

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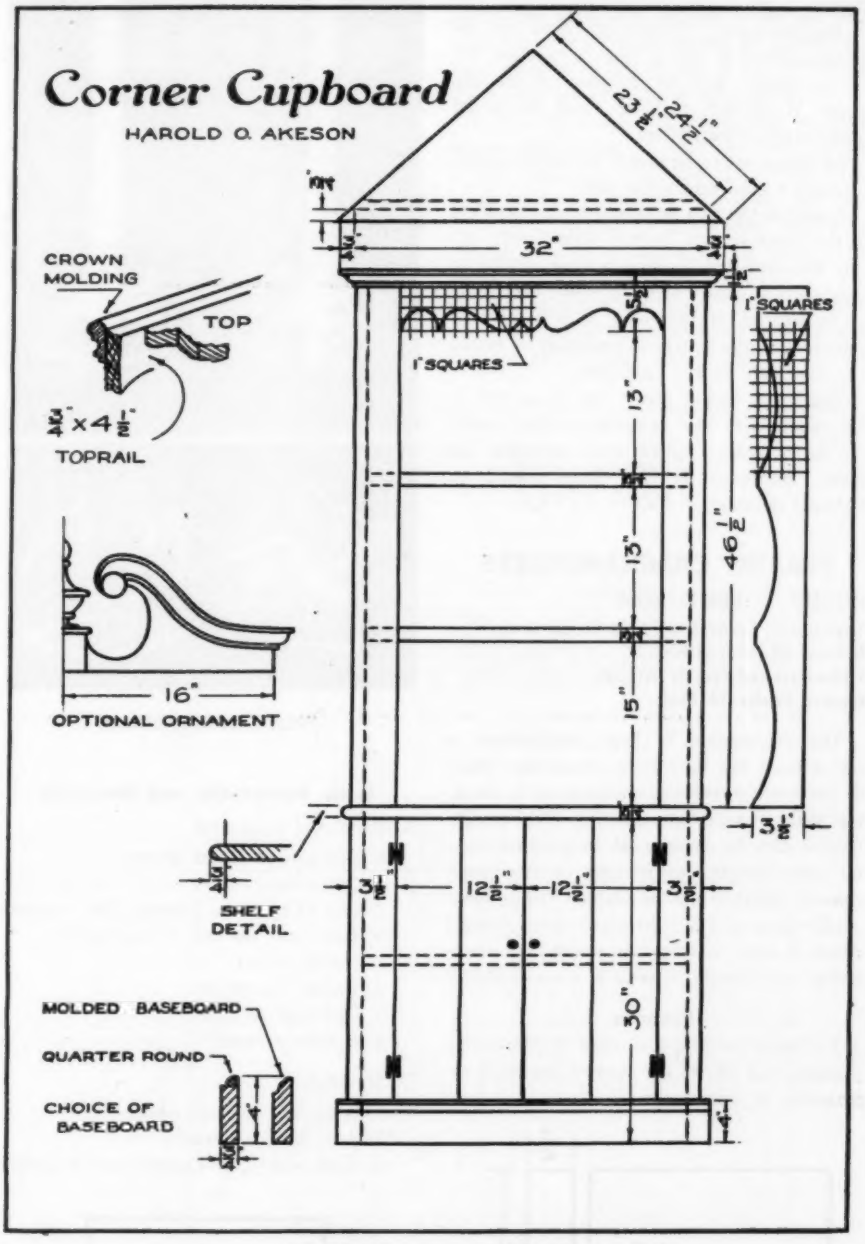
With the change of home design, reduced number of rooms, and simplified living, built-in furniture has become the vogue. This is especially true with the new homes where there is a combination dining room and living room, or a living room large enough to accommodate the dining room facilities. In either of the above cases a built-in corner cupboard would be not only practical for storage and display of dishes but would add to the appearance and charm of the room and saves buying a piece of furniture. A pair of these cupboards could be used to advantage if the room is so arranged as to permit.

Corner cupboard

If it has not been on the list of items to add to your home, perhaps the suggested illustration and drawing will get you interested because it is an addition worth having.

The selection of materials depends upon the type and finish of woodwork already in the room. The cupboard will fit into the room more satisfactorily if it is of the same material and finish. The dimensions as shown on the drawing are for an average size dining room or alcove, but could be made wider if the space warrants.

In constructing the corner cupboard it is advisable to build it in two separate units for convenient handling and then assemble them. Most practical to start, would be the base piece. Prepare stock for the front, sides, top, and bottom. All lumber to be ¾ in. thick. It would be advisable to use plywood for the side pieces. If unable to obtain one wide board for the top and bottom pieces, two or three pieces jointed, doweled, and glued together would do as well. The top shelf is deeper to allow for overhang. Plywood could be used for the bottom piece. Supporting strips, added to the underneath of top, and on bottom parts, as a frame to support and fasten the side pieces, are recommended.



Details of corner cupboard

The doors may be either standard mill stock, tongue and groove joints, even or random widths, or built of plywood with ½-in. flat molding used to simulate panelings.

Baseboard of the cabinet should match that used in the room.

Material for the upper part of the cabinet may now be prepared, the larger units consisting of the side pieces, to be made first. These may be of ¾-in. plywood unless the matched board effect is desired. Then it is to be tongue and groove joint, even or random widths, to match the arrangement of the doors in the lower part of cupboard. Next are the shelves. The top one is deeper, to allow for the overhang, and for support of the top piece. If desired, molding could be nailed under each of the shelves.

All pieces are to be glued, as well as nailed, to make a good substantial job.

Assemble the two units and hang the doors in the lower section. Before permanently setting the cupboard in place remove section of baseboard in corner of room where it is going to be located. If the room is in process of construction the matter is simplified by fitting the baseboard to the cupboard.

The finish should match the woodwork in the room. With new construction that would not be as great a problem as matching old finish. Hardware for the doors should be Colonial in design.

PLASTIC CANDLEHOLDERS

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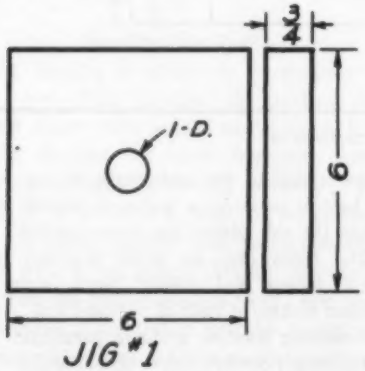
Grand Forks, N. Dak.

The construction of these candleholders is not difficult nor is it time consuming. Many of the basic operations encountered in working with plastics are included. The candleholders may be constructed from either crystal clear acrylics or of any of the many colored plastics now available. The student is able to see and feel the plastic being molded which in itself is very fascinating and stimulating to his natural interest in a new material.

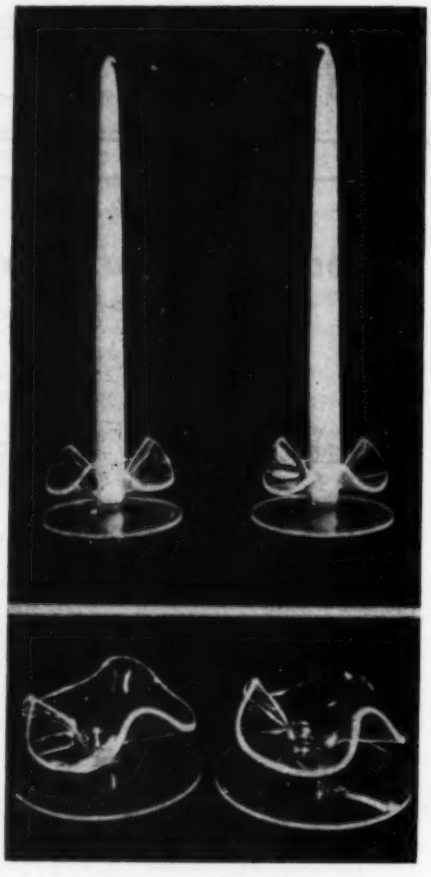
Purpose

To teach the processes used in fabricating plastics, and afford the student practical experiences in this media.



JIG #1

Plastic candleholder

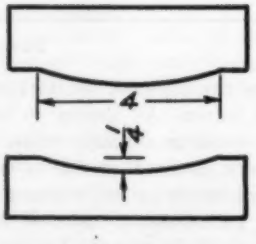


Plastic candleholders

Tools, Equipment, and Materials

A. Tools and equipment
1. One pair of cotton gloves
2. One oven
3. One 12 by 12-in. asbestos sheet (paper)
4. Band saw, jig saw, or coping saw
5. Buffing wheel
6. Buffing compound
7. One heat indicator
8. Cabinet scraper

B. Materials
1. A ¾ by 6-in. pine board
2. A ¾ by 6-in. dowel
3. A jig with ¼-in. convex-concave surface



JIG #2

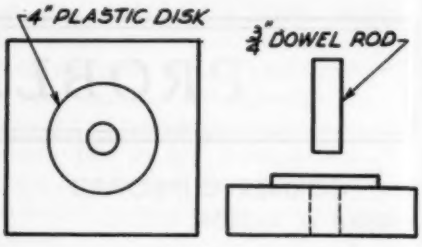


FIG. 1

Fig. 1. Force dowel rod into hole and if plastic is soft enough a design will appear

4. Methelene dichloride cement or Dupont cement (acetone base)
5. Various colored aniline dyes
6. Four 4-in. disks of ⅛-in. plastic

Information

The plastic to be used must be an acrylic; preferably Lucite or Plexiglas. The total cost of the completed candleholders will be approximately $1. Retail price will be $3 to $3.50.

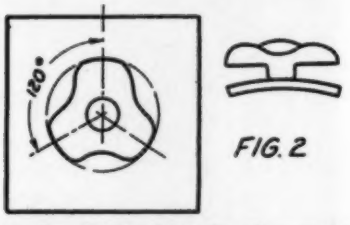


FIG. 2

Fig. 2. Note: Dowel rod must be perpendicular to jig to get a design that is equidistant, with 120 deg. between each flute. Additional shaping of flutes may be done by hand

Be very cautious not to overheat the plastic as it will bubble internally and the piece will be ruined; 275 deg. F. will render the plastic completely workable and still be safe.

The dye may be mixed with warm water but should be allowed to cool to 180 deg. F. before attempting to dye the plastic because if the water is too hot, the candleholders will go back to their original flat state.

Procedure

1. Secure stock.
2. Cut a board ¾ by 6 by 6 in., and drill a 1-in. hole in the center. Jig No. 1.
3. Cut off a piece of ¾ by 6-in. dowel rod.
4. Turn jig to be used for convexing and concaving base on lathe with a ¼-in. concavity. Jig No. 2.
5. Paste flannel on Jig No. 2 when completed to prevent markoff.
6. Lay out four disks 4 in. in diameter directly on the masking paper with a pencil compass. Cut out the disks.

7. Paste disks together with mucilage (leave masking paper on).
8. Sand to round.
9. Buff edges on buffing wheel if polished edges are desired.
10. If opaque edges are desired, scrape edges with cabinet scraper or sandpaper grade 400A wet or dry.
11. Insert a 12 by 12-in. piece of asbestos paper in oven.
12. Heat oven to 275 deg. F.
13. Place two disks in oven to heat.
14. Remove one disk and place in jig No. 2.
15. Remove other disk (wave in the air to set the surface thereby reducing chance of markoff) and place directly over center of hole in jig No. 1.
16. After pieces have set, remove from the jigs and do any final buffing necessary.
17. Apply cement to both base and upper half of candleholder and join two sections.
18. If a color is desired immerse whole object in dye and allow an allotted time for each one so that degree of hue is the same.
19. Wash with soap and water.
20. Apply coat of wax.

REFERENCE

Cherry, Raymond, *General Plastics Projects and Procedures* (Bloomington: McKnight and McKnight, 1948), whole book.

Working with Plexiglas, Rohm and Haas Co., Washington Square, Philadelphia (5), Pa. Copyright, 1947.

To increase America's oil supply by a million barrels a day would require 1,848,000 tons of steel and $965,000,000, or almost a thousand dollars and two tons of steel per barrel of oil. — *Petroleum Newsnotes*, American Petroleum Institute, New York City.

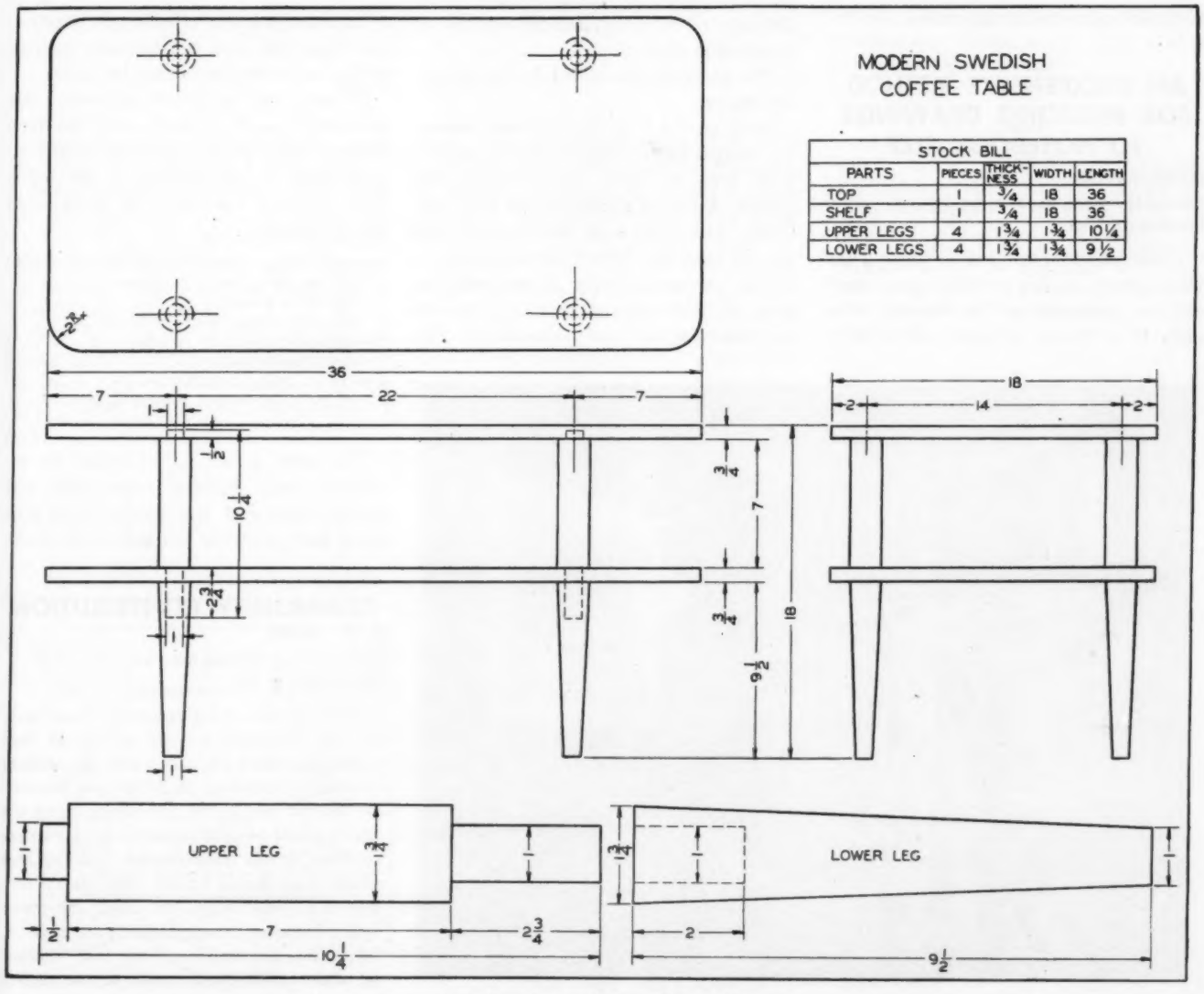
MODERN SWEDISH COFFEE TABLE

V. E. BROADBENT
San Jose, Calif.

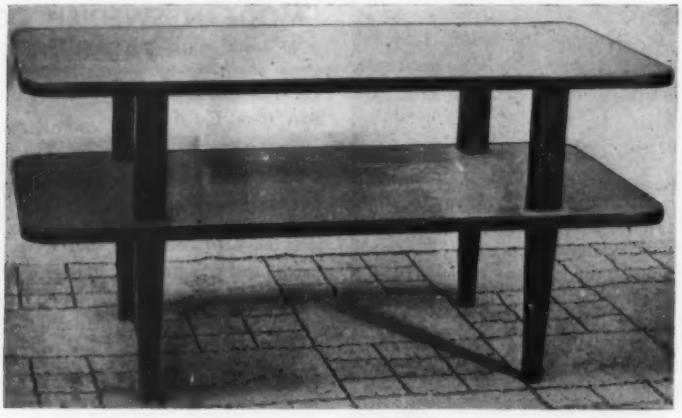
The modern Swedish coffee table described herein has been very popular in the writer's high school and adult classes in woodwork. It is easy to construct, has a lot of storage space, and fits into the modern home.

It can be made with round legs or with square tapered legs. If made like those shown in the illustration, the legs are turned on a wood lathe. The holes in the lower legs can be most accurately done between centers in the lathe with a multispur bit held in a chuck at the live center end.

If the legs are left square, regular tenons are made on the upper legs and mortises cut into the shelves and bottom legs.



Details of Swedish coffee table



Swedish coffee table

In keeping with this style of furniture it is suggested that the project be made of a porous wood such as Philippine mahogany which can be bleached for a light finish. White wood filler adds to the appearance.

AN INEXPENSIVE METHOD FOR REDUCING DRAWINGS TO NOTEBOOK SIZE

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Pittsburgh, Pa.

Conditions frequently arise where a certain drawing or plan is needed in a standard size notebook, but the drawing is usually 18 by 24 in., or larger, and bringing it down to notebook size presents a tedious job of redrawing. Few schools are equipped with a photostat machine, so frequently useful material is by-passed because of the difficulty of reducing and reproducing it to notebook size.

The problem was solved in the following manner.

First, an old 8 by 10-inch view camera was bought and renovated. Then a secondhand lens of 12-in. focal length was bought. A fast or expensive lens isn't necessary, as all the work done is such that time of exposure doesn't matter much.

Next, a stand for the camera and two arms to hold lights were made. See the accompanying half tone. Do not use film in this camera. Contrast process film at present costs around $12 for 25 sheets, i.e., almost 50 cents per sheet. Instead of film, use thin projection vellum such as is employed in photo copy machines. This paper, oddly, is actually faster than film, costs about $15 per hundred sheets, and when developed is itself a finished tracing that can be run through any blueprint machine, making as many copies as one desires, at low cost.

As the work is done by students, no labor cost is involved, so neglecting equipment costs which are school property, a dozen drawings may be reduced to 8 by 10-in. negatives which fit nicely on 8½ by 11-in. notebook paper at the following costs:

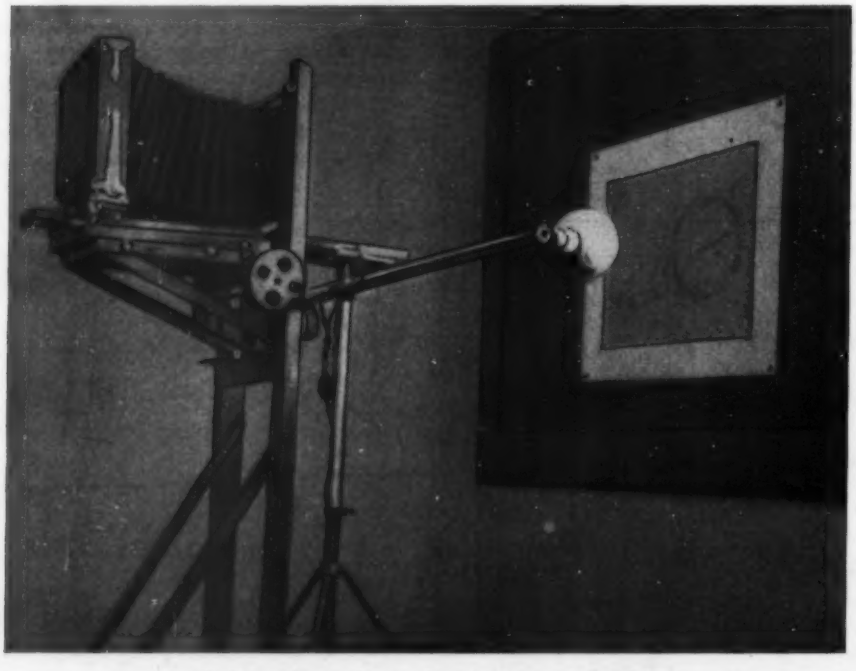
12 sheets of projection vellum @ 11¢	$1.32
1 quart of D-72	.45
2 lb. of hypo @ 10¢	.20
	$1.97

or at a cost of about 17 cents per negative, and then from this negative any number of blue or white prints may be made.

If one tried by actual redrawing this material to such a small scale, the time element alone would make the work impracticable, to say nothing of the tedius labor involved. The cost of the whole setup was as follows:

1 — 8 by 10-in. camera (secondhand)	$50
3 — 18 by 20-in. trays (stainless — made in school)	6
1 — Camera stand (made in school)	6
2 — light arms (made in school)	4
2 — photoflood bulbs	3
1 — 12-in. lens (secondhand)	60
3 — 8 by 10-in. double holders @ $7	21
	$150

The bulbs, paper, and chemicals for developing are, of course, expendable, and are operating cost, but the savings in time alone have made the job well worth while.



Outfit for reducing large drawings to notebook size

COMMUNITY CONTRIBUTION

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Wyomissing School District
Wyomissing, Pa.

On receiving a newly renovated stone house for use as a youth activity center, the local playground board was faced with the problem of suitably furnishing the building at the lowest possible cost to the community. Since the center would be used primarily by school-age children, it was quite natural that the high school shop should be the first agency considered to help supply the need. The necessary preliminary arrangements were made by the parties concerned, and the shop students set about constructing much of the desired equipment.

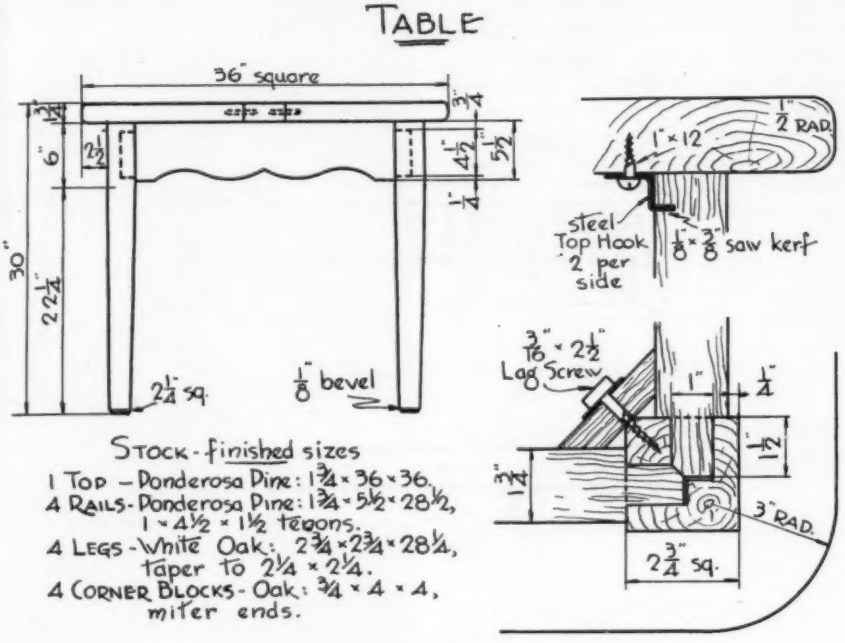
TABLE
36" square
30"
22½"
2¼" sq.
⅛" bevel
1" × 12
½ RAD.
Steel Top Hook 2 per side
⅛" × ⅜" saw kerf
3/16" × 2½" Lag Screw
1"
¼"
1½"
3¼"
3" RAD.
2¾" sq.
STOCK - finished sizes
1 TOP - Ponderosa Pine: 1¾ × 36 × 36.
4 RAILS - Ponderosa Pine: 1¾ × 5½ × 28½, 1 × 4½ × 1½ tenons.
4 LEGS - White Oak: 2¾ × 2¾ × 28¼, taper to 2¼ × 2¼.
4 CORNER BLOCKS - Oak: ¾ × 4 × 4, miter ends.

Fig. 1. Table

Among the furnishings built in the school shop were fifty stools and a dozen tables of a pattern well suited to many other school and civic organizations. For this reason, and the fact that the methods used can be adapted to the construction of many similar projects, the building of the stools and tables will be treated in detail.

Plans were drawn with full attention to simplicity of design and appropriateness to the building in which the furniture would be used. Further considerations were: ease of construction so as to place same within the capabilities of all shop students; ruggedness to withstand the punishment incident to youthful spirits; and ease of maintenance. (Figs. 1, 2, and 3.)

Following approval of the plans by the Center committee, bids were let for the necessary materials. Kiln-dried select Ponderosa pine was specified for stool and table tops since it was available in 16-in. widths, thus reducing the need for gluing up wide stock. White oak was selected for legs and stool rails, again in sizes which would obviate the need for gluing.

Before having the students begin work, the instructor built unglued pilot models, of both the stools and the tables. These not only provided full-size patterns for the machine cutting of all pieces but permitted alternate methods to be compared with the more suitable ones chosen for the students to follow. Next, the work was broken into two general classifications; machine operations which were to be performed by senior high school students, and handwork for the junior high classes. A student foreman was named in each class. It was his duty to assign work and materials to students and supervise their performance. Also, one boy of each group was designated an inspector; his approval had to be given each piece handled by the class before it could be passed on.

The tables being the simpler job, were put under way first. The detailed production schedule follows, not in chronological sequence, however, as a number of the steps could be carried out simultaneously:

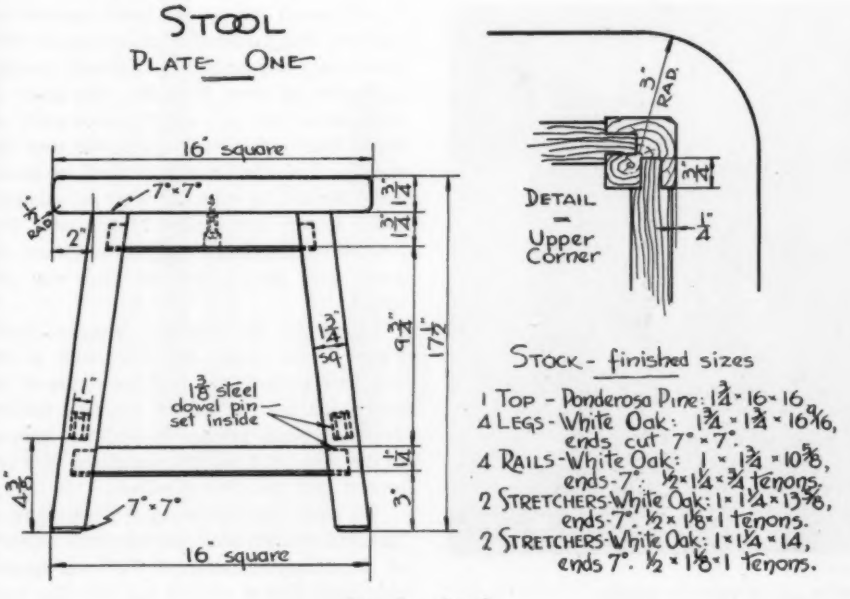
STOOL
PLATE ONE
16" square
7"×7"
2"
1¾" steel dowel pin set inside
7"×7"
16" square
3" RAD.
DETAIL — Upper Corner
STOCK - finished sizes
1 TOP - Ponderosa Pine: 1¾ × 16 × 16
4 LEGS - White Oak: 1¾ × 1¾ × 16 9/16, ends cut 7° × 7°.
4 RAILS - White Oak: 1 × 1¾ × 10 5/8, ends 7°. ½ × 1¼ × ¾ tenons.
2 STRETCHERS - White Oak: 1 × 1¼ × 13 5/8, ends 7°. ½ × 1⅛ × 1 tenons.
2 STRETCHERS - White Oak: 1 × 1¼ × 14, ends 7°. ½ × 1⅛ × 1 tenons.

Fig. 2. Stool

TABLES

Tops	*Machine*	*Grade*
Cut and square stock	Circular saw, jointer	12
Joint and set dowels	Drill press	9
Glue up		9
Dress and square	Circular saw, jointer	12
Round corners	Band saw	11
Round edges	Electric router shaper	11
Machine sand	Belt sander	10
Hand sand		7
Legs		
Cut and square stock	Circular saw, jointer	12
Cut mortises	Mortiser	10
Drill pilot holes for steel dowel pins	Drill press	9
Taper	Band saw, jointer	11
Flatten inside corners for brace	Jointer	11
Bevel lower ends	Disk sander	10
Rails		
Cut and square stock	Circular saw, jointer	12
Cut tenons	Circular saw	12
Cut scrolled edges	Band saw	11
Sand scrolled edges	Drum sander	10
Groove for top fasteners	Circular saw	12
Fit mortise-and-tenon joints		8
Sand leg and rail faces	Belt sander	10
Glue up frames		9
Set steel dowel pins across tenons		9
Cut and attach corner braces		8
Attach tops		8
Finish cleaning and sanding		7, 8
Apply two coats of finish, 24-hour interval		7
Wax and buff		7

Just as soon as all parts for the tables had been cut, work was begun on the stools according to the following schedule:

STOOLS

Tops	*Machine*	*Grade*
Cut and square stock	Circular saw, jointer	12
Round corners	Band saw	11
Round all edges	Electric router shaper	11
Machine sand	Belt and disk sander	10
Hand sand		7
Legs		
Cut to length, 7° by 7° compound cut both ends	Circular saw	12
Cut mortises	Mortiser	10
Drill pilot holes for steel dowel pins	Drill press	9
Bevel outside corners	Jointer	11
Upper Rails		
Cut to size, 7° miter both ends	Circular saw, jointer	12
Cut tenons	Circular saw	12
Drill screw holes	Drill press	9
Lower Stretchers		
Cut to size, 7° miter both ends	Circular saw, jointer	12
Cut tenons	Circular saw	12
Fit mortise-and-tenon joints		8
Bevel edges of rails and stretchers	Jointer	11
Glue up frames		9
Set steel dowel pins across stretchers from inside		9
Dress and clean		8
Attach tops		8
Finish sanding		7, 8
Apply two coats of finish, 24-hour interval		7
Wax and buff		7

There are many finishes appearing on the market. It is well to choose one which will speed up the finishing process and yet insure

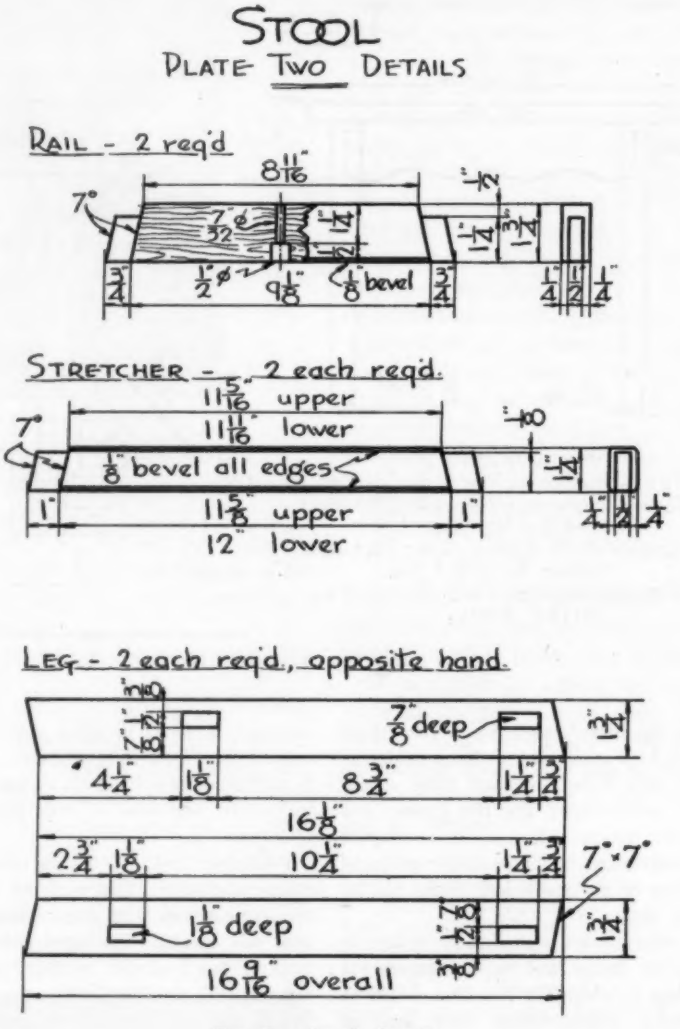

Fig. 3. Stool details

Fig. 6. Completed furniture in youth activity center

a professional job by the lesser experienced students. The preparation chosen should also permit easy maintenance, i.e., merely another application to cover blemishes. One quart of dark oak oil stain was added to each gallon of finish, thus eliminating a separate step for staining. The mixture was brushed on generously, the residue wiped off after ten minutes, and a second coat applied 24 hrs. later. Before delivering the completed furniture, all pieces were given a coat of paste wax and buffed.

Throughout the work, a progress chart, Figure 5, was posted and maintained. It not only kept students aware of the status of the entire job but tended to promote healthy rivalry between groups. In addition, visitors to the shop were quickly acquainted with the project and the effort involved.

The entire job took about 3½ months from the date lumber was received until delivery of the completed furniture. This was reasonably good time in view of the fact that most

Fig. 4. Annex E – Student mortising stool legs

of the students were scheduled for but two 45-min. shop periods per week. Of course, the project necessitated a sharp adjustment in the regularly scheduled plans for the school year but many of the tool processes used in constructing the stools and tables were part of the usual program. In addition, the classes obtained a basic idea of simple production methods, opportunity for which ordinarily is lacking in the small school shop. Furthermore, the value of the students' contribution to their community was considered to be greatly in excess of any temporary inconveniences caused within the school.

TEACHING-LEARNING DEVICE FOR MECHANICAL DRAWING

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High School
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College, Columbia University

Experience has taught all teachers of industrial arts and vocational classes that understanding a three-view drawing is easy for many students, but for others it may be a struggle that pupil and the teacher may long remember. It is the purpose of this article to present a teaching-learning device which may prove a valuable supplement to the three-plan, transparent projection box which is universally used to teach orthographic projection in shop, mechanical drawing, and blueprint reading classes.

First let us make a check of what is involved in developing the students' ability to understand the so-called three-view drawing. Without a doubt the major hurdle for students is the problem of visualizing the solid object when represented graphically in two or more two-dimensional views taken from different sides of the object. This ability to visualize demands that the student be able to put together (synthesize) in his mind an image of the solid object, deriving all his information from the three separate two-dimensional views. This is quite a job of translation, and it is not surprising that great differences in achievement show up.

Most of us would agree that the present type projection box adequately demonstrates the mechanics by which we arrive at the standard orthographic views of an object; however, this familiar device does not give much direct assistance in the mental process of visualization. It would appear, then, that what we need is a device which will give a simultaneous projection of the three standard views of an actual object so as to offer

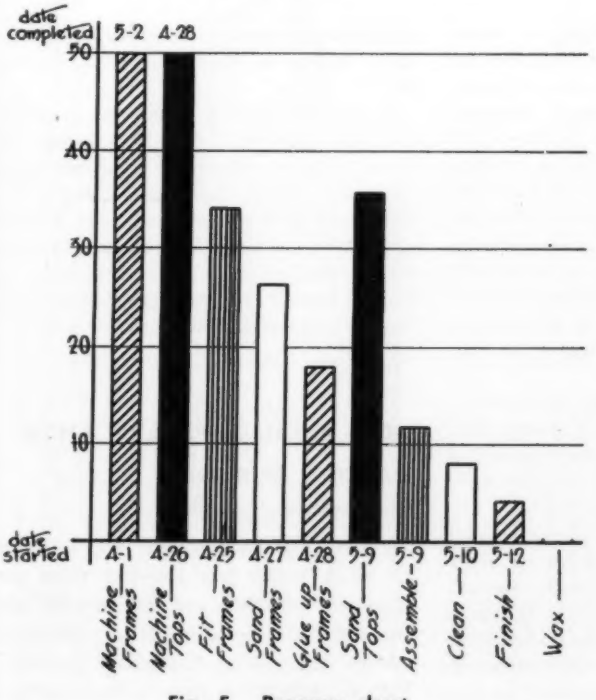
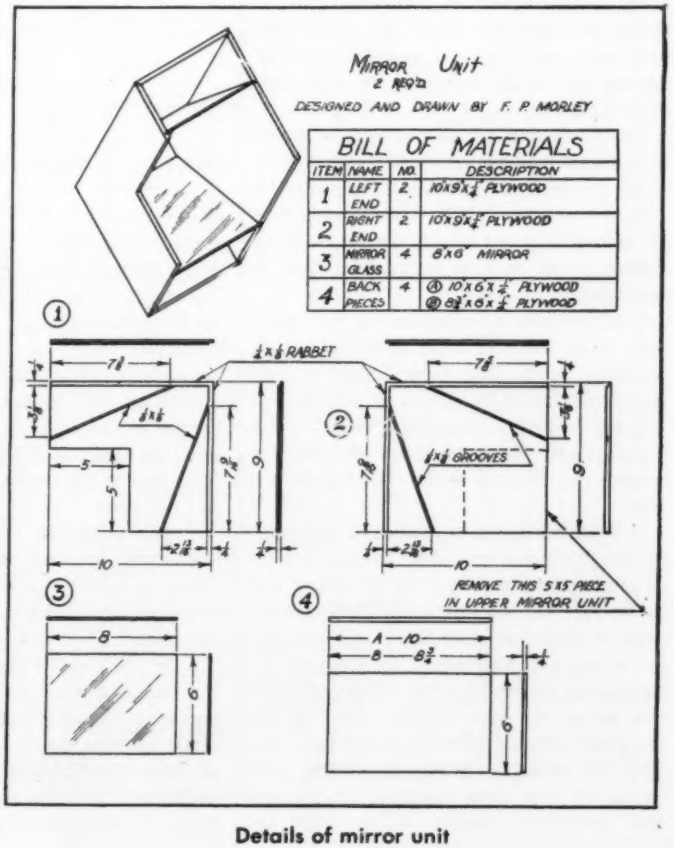
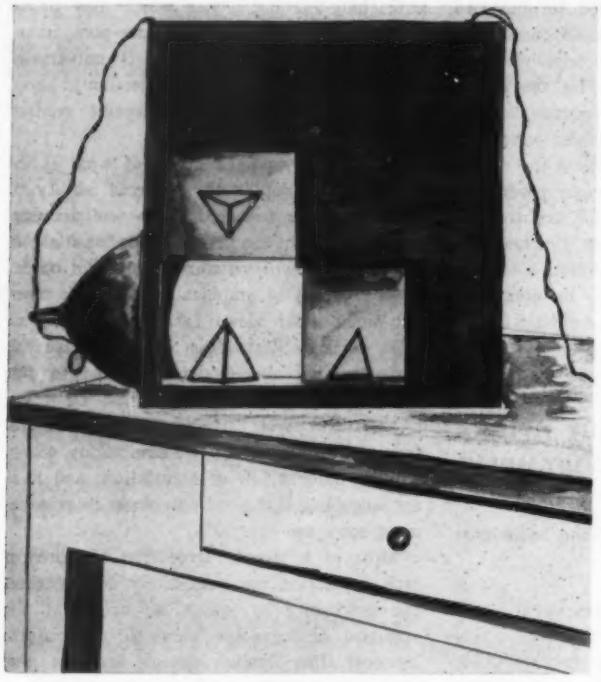


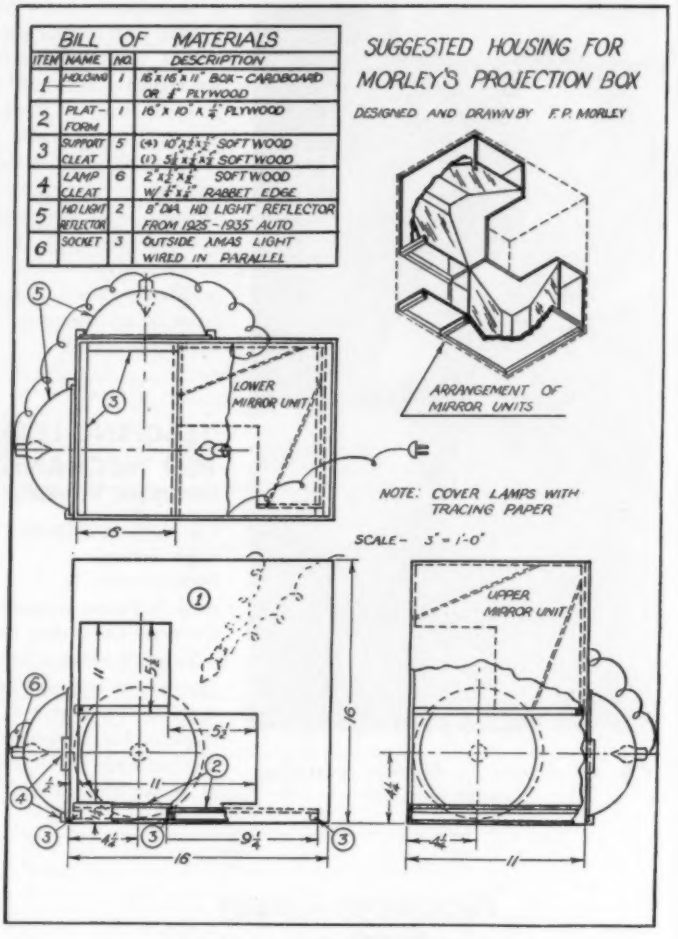
Fig. 5. Progress chart



Details of mirror unit



A device for simultaneously projecting three views of an object


BILL OF MATERIALS
ITEM NAME NO. DESCRIPTION
1 HOUSING 1 16"x16"x11" BOX - CARDBOARD OR ¼" PLYWOOD
2 PLAT-FORM 1 16" x 10" x ¼" PLYWOOD
3 SUPPORT CLEAT 5 (4) 10" x ¾" x ¾" SOFT WOOD (1) 5¼" x ¾" x ¾" SOFT WOOD
4 LAMP CLEAT 6 2" x ¾" x ¾" SOFT WOOD W/ ¼" x ¾" RABBET EDGE
5 HD LIGHT REFLECTOR 2 8" DIA. HD LIGHT REFLECTOR FROM 1925 - 1935 AUTO
6 SOCKET 3 OUTSIDE XMAS LIGHT WIRED IN PARALLEL
SUGGESTED HOUSING FOR MORLEY'S PROJECTION BOX
DESIGNED AND DRAWN BY F.P. MORLEY
ARRANGEMENT OF MIRROR UNITS
LOWER MIRROR UNIT
UPPER MIRROR UNIT
NOTE: COVER LAMPS WITH TRACING PAPER
SCALE - 3" = 1'-0"

Details of assembled project box

an opportunity to experiment with and study the dynamic relationship between the actual object and its orthographic views. It is the belief of this writer that the apparatus discussed and described below will answer this need and prove to be a valuable teaching-learning aid for the industrial arts and vocational classroom.

The illustration pictures a working model of this new type projection box with a stick model of a triangular pyramid being projected.

Here are a few of the claims concerning the accomplishments of this device and some suggestions as to how it may be used in the classroom.

1. It presents a projection of the three, basic linear views of stick models of simple geometric solids. The linear image in each view is reinforced by lighted surfaces behind — lamps covered with tracing paper silhouette the front and side views, and a white surface beneath the object does the same for the top view.

2. With the object in position it is possible for the instructor or student using a pointer to touch points or edges of the object and to observe that the location of these specific parts of the object is simultaneously indicated in the top and side views. To illustrate the significance of this function of the projection box let us go back to the model of the triangular pyramid pictured in the half tone. With this object in the box the student could touch the front base point of the pyramid and immediately observe that his finger appeared in the top view, touching the lowest point, and in the side view, touching the point farthest left. This would at once demonstrate to him what is the front of the object in the top and side views.

3. Again referring to the model pictured by the half tone with stick models, and with the attendant linear views, an instructor can dramatically demonstrate the foreshortening of lines as they assume different angles with the projection planes of the three views. Observe the apparent difference in length of the front edge of the pyramid as seen in the front and top views.

4. The projection of a flat surface as a line — when seen edgewise — is quickly illustrated as in the case of the back surface of this pyramid showing up as only a line in the side view.

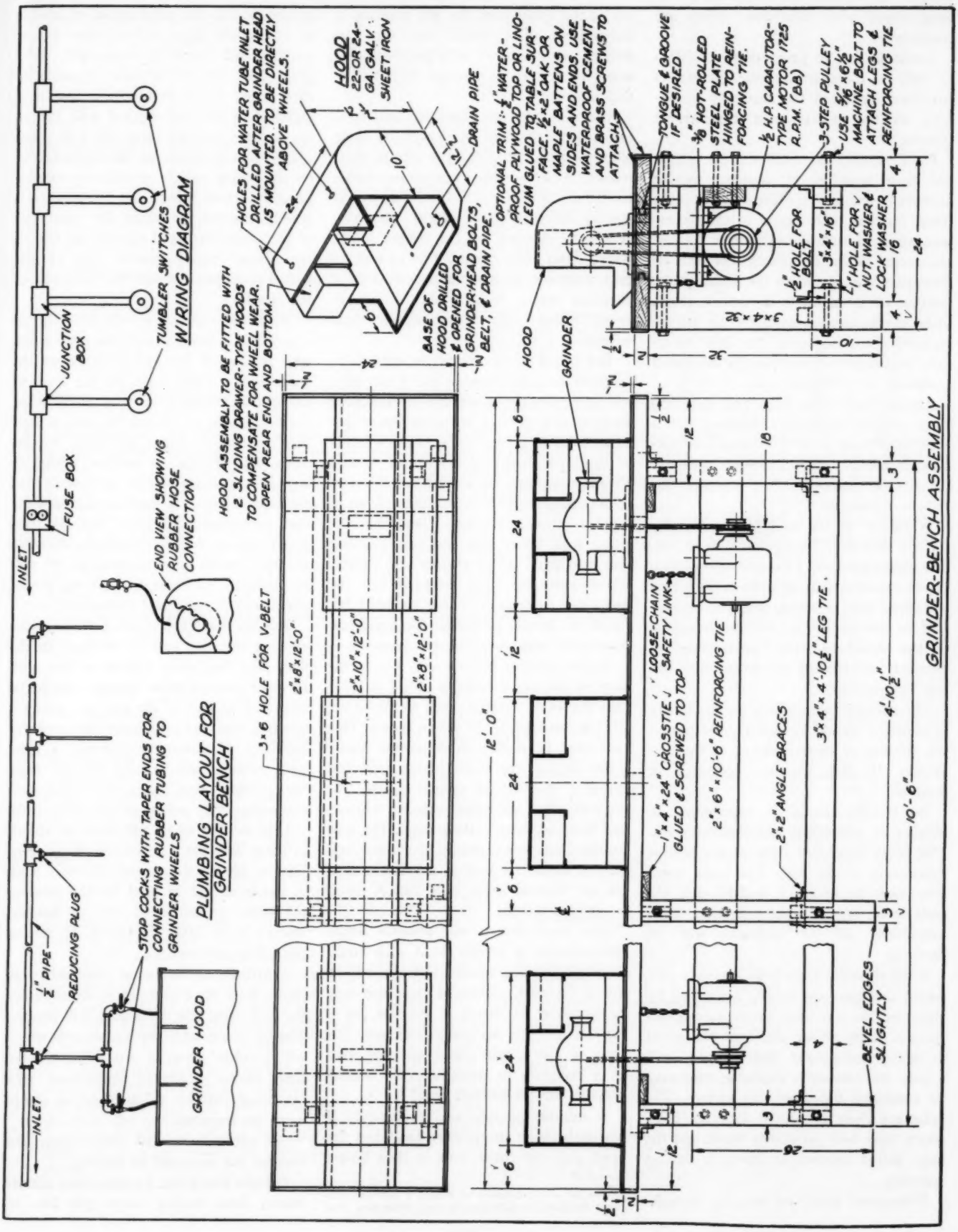
5. In addition to the use of stick models for the instruction of principles of orthographic projection, actual objects, especially small machine parts, are clearly delineated in three views because of the graduated intensity of light reflected by their many surfaces. Of course this differentiation of surfaces would be much improved by adding identifying chalk coloring to the planes of particular interest.

Because the working model was available to classes only for a few days at the end of last semester, the use of it has not been adequately tested. However, in that short time many students saw and experimented with the possibilities of this teaching-learning device. The writer feels that this type of teaching-learning possesses possibilities that future experimentation may disclose.

AN IDEAL LAPIDARY SHOP

FRANCIS J. SPERISEN
San Francisco, Calif.

During the past decade, the lapidary art as a hobby has emerged from the basement workshop and has invaded the arts and crafts departments in many high schools and colleges throughout the land. This is particularly true in those institu-


WIRING DIAGRAM
JUNCTION BOX
TUMBLER SWITCHES
FUSE BOX
INLET
PLUMBING LAYOUT FOR GRINDER BENCH
STOP COCKS WITH TAPER ENDS FOR CONNECTING RUBBER TUBING TO GRINDER WHEELS.
1/2" PIPE
REDUCING PLUG
INLET
GRINDER HOOD
END VIEW SHOWING RUBBER HOSE CONNECTION
HOOD ASSEMBLY TO BE FITTED WITH 2 SLIDING DRAWER-TYPE HOODS TO COMPENSATE FOR WHEEL WEAR. OPEN REAR END AND BOTTOM.
HOLES FOR WATER TUBE INLET DRILLED AFTER GRINDER HEAD IS MOUNTED. TO BE DIRECTLY ABOVE WHEELS.
HOOD 22-OR 24-GA. GALV. SHEET IRON
DRAIN PIPE
BASE OF HOOD DRILLED & OPENED FOR GRINDER-HEAD BOLTS, BELT, & DRAIN PIPE.
3×6 HOLE FOR V-BELT
2"×8"×12'-0"
2"×10"×12'-0"
2"×8"×12'-0"
OPTIONAL TRIM :- 1/4" WATER-PROOF PLYWOOD TOP OR LINOLEUM GLUED TO TABLE SURFACE. 1/2"×2" OAK OR MAPLE BATTENS ON SIDES AND ENDS. USE WATERPROOF CEMENT AND BRASS SCREWS TO ATTACH.
HOOD
GRINDER
TONGUE & GROOVE IF DESIRED
3/8" HOT-ROLLED STEEL PLATE HINGED TO REINFORCING TIE.
1/2 H.P. CAPACITOR-TYPE MOTOR 1725 R.P.M. (BB)
3-STEP PULLEY
USE 5/16"×6 1/2" MACHINE BOLT TO ATTACH LEGS & REINFORCING TIE
1/2" HOLE FOR BOLT
3"×4"×16"
3"×4"×32"
1/2" HOLE FOR NUT, WASHER & LOCK WASHER
LOOSE-CHAIN SAFETY LINK
1"×4"×24" CROSSTIE GLUED & SCREWED TO TOP
2"×6"×10'-6" REINFORCING TIE
2"×2" ANGLE BRACES
3"×4"×4'-10 1/2" LEG TIE.
12'-0"
10'-6"
4'-10 1/2"
BEVEL EDGES SLIGHTLY
GRINDER-BENCH ASSEMBLY

Lapidary and grinder benches

tions where adult education classes are conducted.

Credit is due to progressive educators as well as those enthusiastic instructors who have imparted the necessary knowledge to the pupils with considerable success.

On a number of occasions, the author has been consulted by students seeking answers to technical problems and at other times, aid has been sought in the recommendation of suitable equipment for the classroom. While completely detailed information is available on the lapidary art, because of its newness in the classroom little information is available as to the equipment required or of the units necessary to comprise a completely integrated workshop for classroom use.

The accompanying plan and specifications describe apparatus sufficient for a class numbering 25 or more, and a competent instructor could without difficulty conduct a class of thirty members by judicious rotation.

While all of the equipment necessary for the shop may be purchased from reliable manufacturers, a considerable portion of the apparatus can be made in the school workshop, thus providing practical instruction in shopwork that will be beneficial to the school as well. Construction, as detailed, will provide equipment that will last for decades.

The benches upon which the machinery is mounted should be sturdy, yet permit the shifting or rearrangement of the machinery if that becomes necessary or desirable.

No trouble should be experienced in making or assembling the grinder bench. The most important item is the correct fabrication of the legs. The cross members must be of equal lengths, and the ends must be cut square so that when assembled, all leg elements will be identical.

If all elements have been correctly prepared, the units are readily assembled by clamping the top cross member to a flat surface, after which the legs are glued in an inverted position and clamped, or if a large flat surface is available, they may be assembled flat upon this surface. The bolts are then introduced into the holes which have been previously bored and the units bolted together as shown in the leg assembly.

Waterproof glue must be used throughout as the spray from the wet grinding is unavoidable. The bench top may be covered with a panel of waterproof plywood, or it may be covered with battleship linoleum.

After the top has been finished, it is fastened to the legs by means of angle plates fastened with No. 8 or 10 r.h. wood screws. A 2 by 6-in. reinforcing longitudinal tie is fastened to the inside of the legs at the rear of the bench. This also acts as a support for the hinged motor bases. After final assembly it is well to coat with one or more applications of a chemical water seal. When thoroughly dried, follow with two coats of clear varnish.

The bench is now ready to mount the grinders or other equipment. Four conventional grinder heads can be mounted thereon and provide adequate space for eight workers at one time. Grinder heads of the type illustrated in Figures 80 and 81 on page 77 of the book titled *The Art of the Lapidary** are available from a number of manufacturers. These tools are fitted with grease-seal ball bearings and will provide years of trouble-free service. These tools are fully enclosed and the belt drive is from a motor mounted beneath the bench, providing the maximum protection from spray or grit particles.

As the grinding is done wet, it is necessary to provide a suitable shield to contain the water spray as well as discharge. This is provided in the design shown. This unit may be readily made in the sheet-metal shop of the school, again providing practical training for mutual benefit. All exposed edges are rolled over for stiffness and to avoid sharp cutting edges. The hole for the drain pipe is swaged or countersunk on the inside to provide a suitable area for the flanged drain pipe fitting which is soldered thereto.

The hood shown will provide ample clearance for a grinder head with 10-in. diameter grinding wheels. If larger wheels are to be used, additional clearance may be acquired by using a subbase, or a plate ring of the necessary thickness. The base of the grinder head may be used as a template to mark out the bolting holes as well as the belt hole.

A suitable packing seal (velumoid) is placed between the grinder head and the hood and the entire unit is then bolted to the bench. An application of shellac or waterproof paint to both sides of the packing will assure a watertight, leakproof job. The motor base is made of sheet steel, 5/16 or 3/8 in. thick and it is attached to the rear support with hinges, the forward support being the belt itself.

Provision of a two- or three-step pulley on the motor spindle provides a suitable range of wheel speeds and the change is readily effected by lifting the front end of the motor base and placing the belt in the desired pulley groove. The electric switch is mounted under the front rail of the bench.

The drains from the grinder bench hoods empty into a sump. A suitable bilge pump may be used if required to discharge the water into a drain pipe. As the level of the grinder bench is usually higher than the drain pipe in the nearby sink, a suitable connection from the latter to the sump will provide an efficient drain. In any case a sump should be installed so that the heavy grit may be settled from the discharged water and the grit disposed of at regular intervals. Suitable electric conduit and connections as well as plumbing will complete the equipment and make it ready for immediate use.

The lap bench is composed of two units, each 18 in. wide and 12 ft. long. In the floor plan this bench appears as one unit. If space permits these benches should be separated as half of the laps are used for grinding and the remainder are used for polishing. If mounted as shown, a glass wall partition will prevent the grit from the grinding laps flying over and contaminating the polishing laps or wheels.

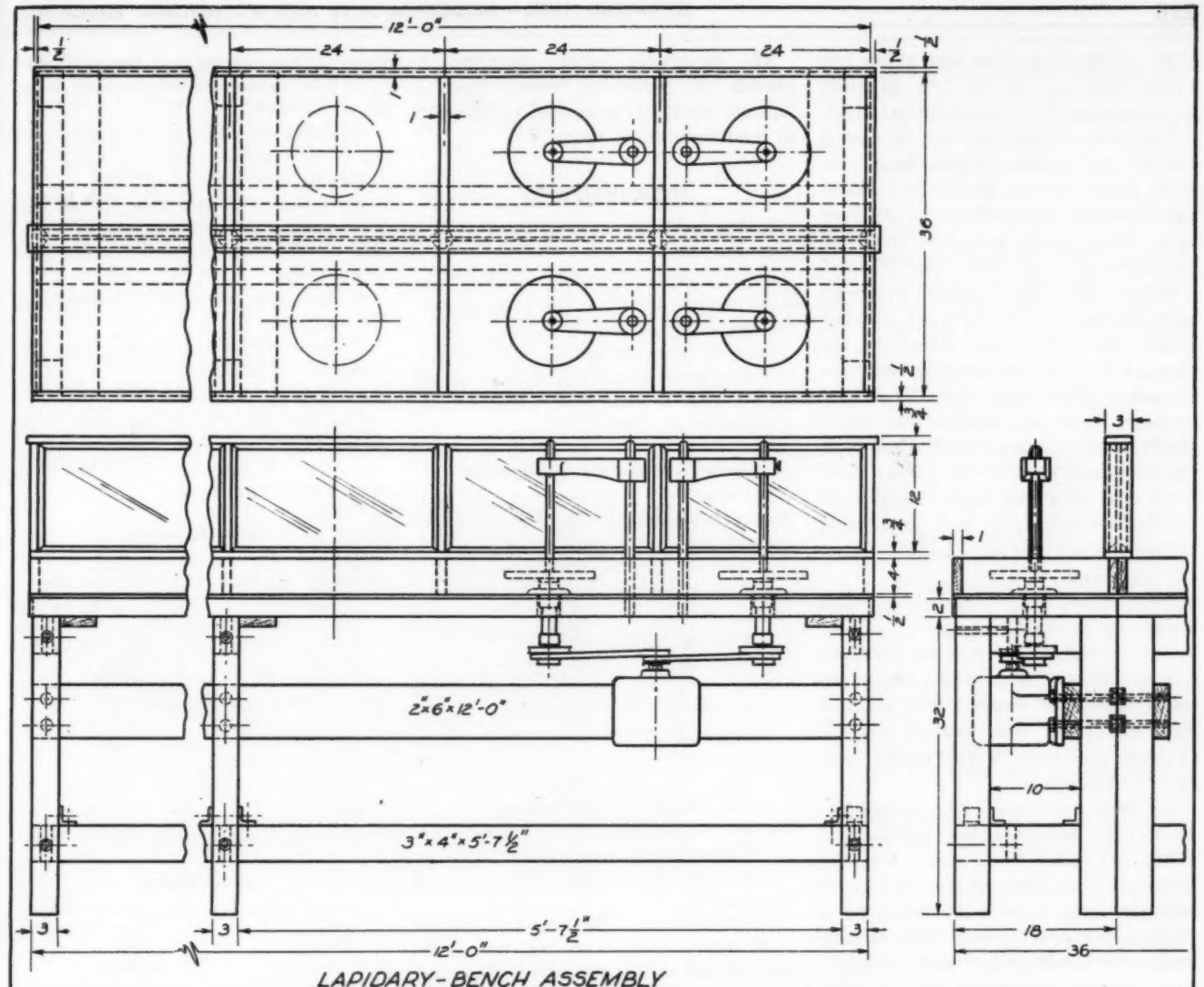
Legs for the bench are made as shown in sheet one, the top however is made of 1¼- or 1½-in. waterproof plywood. Oak or maple should be used for the sides of the boxes as hardwood can be finished smooth with little likelihood of raising the grain excessively.

A fifth bench similar in construction to the grinder head benches is required for the slab saws, trim saws, and drill presses. The latter are set at 24-in. intervals which will provide adequate space for the six tools shown. Electrical connections with individual switches to all pieces of equipment are required.

As outlined in the floor plan, the benches are equipped as follows:

Grinder bench No. 1 carries four grinder heads, three having coarse grit No. 60

*The Art of the Lapidary by Francis J. Sperisen. Published by The Bruce Publishing Co., Milwaukee, Wis.



NOTE:- TWO LAPS TO BE EQUIPPED WITH REVERSING-TYPE MOTOR AND SWITCH FOR POLISHING LAPS IF FACET CUTTING IS REQUIRED.

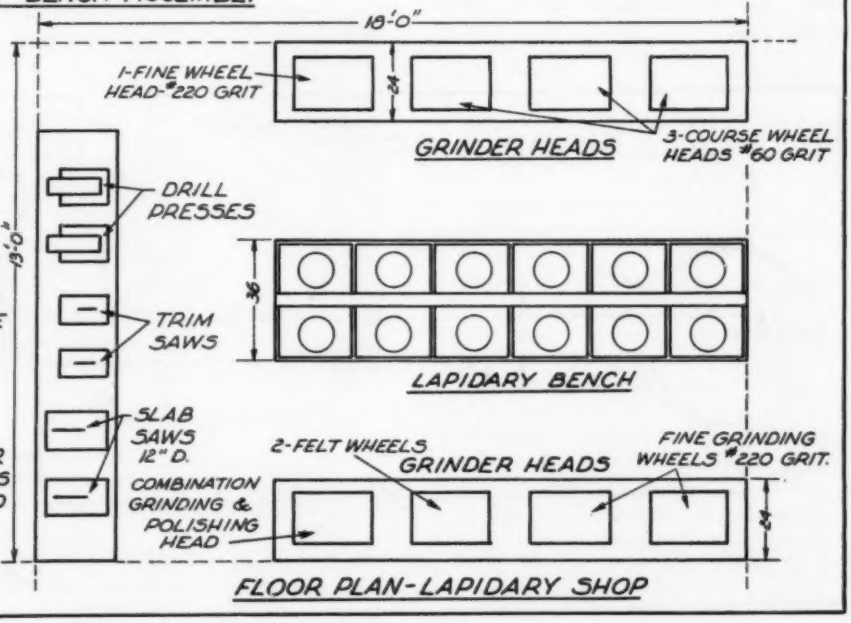
MOTOR TO BE ⅓ H.P. BALL-BEARING TYPE. 1725 R.P.M. BOLT MOTOR TO 2"x6"x12'-0" MOTOR SUPPORT. ONE MOTOR IS AMPLE POWER TO SUPPLY TWO LAPS.

LAP SPINDLE SPEED EQUALS 300 TO 500 R.P.M. SPEED CHANGE REDUCTION ACQUIRED THROUGH SUITABLE PULLEYS & BELTS.

LAP BENCHES WITH GLASS PARTITIONS (AS SHOWN) RECOMMENDED.

LADIDARY BENCH AND GRINDER BENCH CONSTRUCTED OF DOUGLAS FIR OR EQUIVALENT. CROSSTIES TO BE OAK OR MAPLE.

REFER TO GRINDER-BENCH ASSEMBLY FOR CONSTRUCTION DETAILS.



Lapidary and grinder benches

or No. 80 wheels, and one head having two wheels of fine grit, say No. 220. All grinding wheels are 10 in. in diameter. Eight-inch diameter wheels also may be used if desired. All grinding wheels have 1-in. faces. Paper blotters should be removed and replaced with rubber or velumoid sheet. Four ½-h.p. capacitor type ball bearing motors, 1725 r.p.m., are required.

Grinder bench No. 2 carries two grinder heads having fine, No. 220 grit, grinding wheels; one grinder head having two felt wheels 8 by 2 in.; one combination grinding and polishing head similar to the one shown in Figure 81, page 77, *The Art of the Lapidary*. In using a head of this type, the left hand side of the grinder hood is left open to provide ample clearance for the various tools used, such as assorted carving and grinding tools, spindles, reamers, and wheels.

Two ½-h.p. motors and two ⅓-h.p. motors are required.

Two lap benches are required, equipped with six spindles each. The grinding lap bench should be supplied with six iron laps, six pewter laps, and six sanders. Optional equipment is two copper laps, diamond charged.

Polishing lap bench, six tin laps, six maple laps, and six leather polishers.

Lapidary bench No. 4 carries two slab saws with 12-in. diamond saw blades; two trim saws with 6- or 8-in. diamond saw blades; two drill presses with suitable drills, tubes, and other tools. Optional tools, faceting equipment may be added at any time.

The equipment herein described is capable of performing every type of lapidary work, and is superior to that seen in most commercial shops.

HOBBYHORSE

JEROME LEAVITT
Evanston, Ill.

This is a hobbyhorse that children can make for themselves, or for their younger brothers or sisters. Before starting to work, look at the materials and tool lists and collect all of these so they will be ready for use when needed. If white pine is available, use it for all of the pieces.

How to Make the Hobbyhorse

1. Cut a board ½ by 6 by 6 in., and on it draw a 6-in. circle for the wheel. Cut this out with the coping saw.

2. Drill a ¼-in. hole through the center of the wheel. As you drill, wobble the bit a little to make the hole a little larger.

3. File and sandpaper the wheel smooth.

4. On a piece of 9 by 10-in. paper draw a horse's head as shown in the illustration. Cut this out with your scissors.

5. Cut a piece of wood ½ by 9 by 10 in., and trace the pattern of the horse's head on it.

6. Cut out the horse's head with a coping saw, then file and sandpaper it smooth.

7. Cut a piece of wood ½ by 1 by 36 in., for the body of the horse. Then plane and sandpaper it.

8. On each end of the long stick drill one ¼-in. hole in center, 1 in. from the end. On one end drill another hole, also in the center, 1½ in. from the end.

9. Place the stick on the horse's head as shown in the drawing and then drill both ¼-in. holes through the head the same as you did on the stick.

10. Fasten the stick and head together with two ¼ by 2-in. bolts, and use a similar bolt as the axle of the wheel.

11. Use narrow cotton tape for the reins and fasten it on each side of the horse's head, just below the mouth with carpet tacks or small nails.

12. Sandpaper the entire hobbyhorse with fine sandpaper.

13. Draw in the horse's eyes, nose, and bridle with a soft pencil.

14. Give the complete horse two coats of shellac. Let each coat dry six hours before putting on the next.

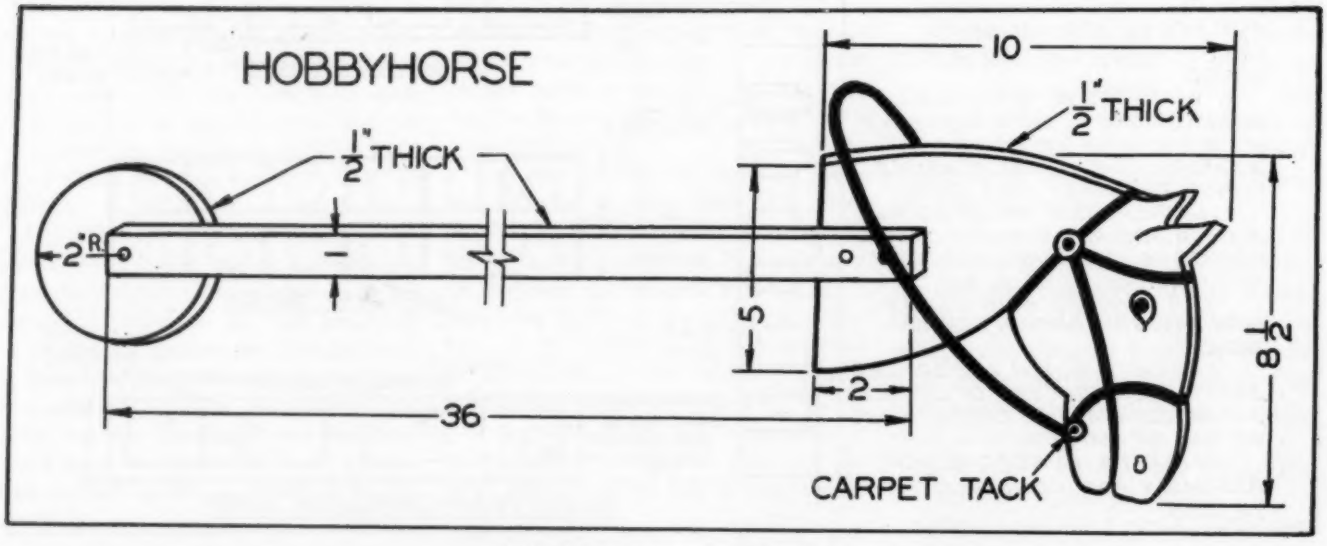
15. Paint the eyes, nose, and bridle black, using a small paint brush.

MATERIALS NEEDED

No. of pcs.	*Material*	*Size*
1	Wood	½ x 6 x 6 in.
1	Wood	½ x 9 x 10 in.
1	Wood	½ x 1 x 36 in.
1	Paper	9 x 10 in.
3	Bolts	¼ x 2 in.
1	Narrow cotton tape, 36 in. long	
2	½-in. Carpet tacks or small nails	
	Black paint	
	Shellac	
1	Sandpaper — No. 1	
1	Sandpaper — No. ½	

TOOLS NEEDED

1 yardstick	1 hammer (claw)
1 pencil	1¼-in. bit or drill
1 compass	1 brace
1 coping saw	1 plane
1 hand saw (crosscut)	1⅛-in. paint brush
1 pr. scissors	1½-in. paint brush
1 file (woodworking)	



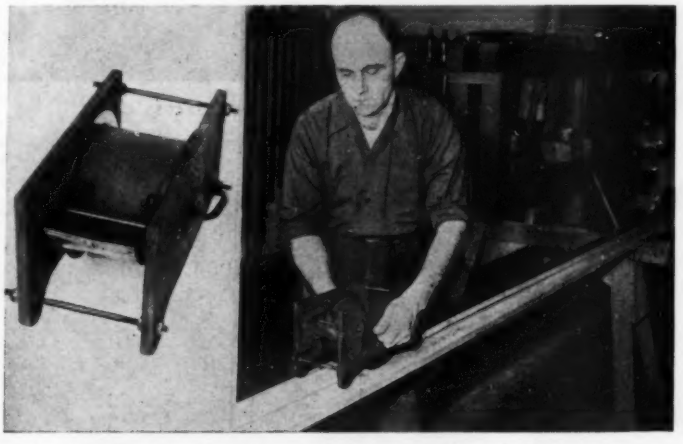
Hobbyhorse by Jerome Leavitt

HANDY GLUE SPREADER

A simple, hand-operated glue spreader, developed at the U. S. Forest Products Laboratory at Madison, Wis., in the course of its research, provides a convenient method of applying a uniform glue film to long, narrow wood strips. The spreader was designed so that it can be moved by hand along the upper surface of the wood strip; it will handle material up to 4 in. in width. The glue reservoir, 4 in. wide and curved to a radius of about 3 in., has sufficient capacity to cover about 75 lineal feet of nominal 2 in. wide lumber at a spreading rate of 50 pounds of glue per 1000 square feet of area. The simplicity of the unit facilitates thorough, easy cleaning after use.

The compactness and portability of the device make it especially useful for small gluing operations where limitations of space or cost do not permit the use of a stationary, motor-driven spreader. Its construction requires only those skills and facilities ordinarily found in a small workshop.

The spreading mechanism consists of a cylindrical wood block or roller mounted in a plywood frame. The cylinder is covered with corrugated rubber floor matting and is flanked with protruding metal flanges. The metal glue reservoir is hung on the bolt so that its bottom edge forms a "doctor" bar with the cylinder and can be adjusted to regulate the flow of glue. Rubber skirts form a seal between the sides of the reservoir and the flanges.



Handy glue spreader, U. S. Forest Products Laboratory at Madison, Wis.

PRESS MOLD—A GOOD CERAMIC PROJECT

VERNON D. SEELEY
Livingston Manor Central School
Livingston Manor, N. Y.

FOR CERAMICS

The press mold lends itself very readily for a beginning project in a general shop or a unit ceramic shop. It is easily done, takes very few materials, and very small firing space in the kiln. The students can be assured of good results in the beginning of their course.

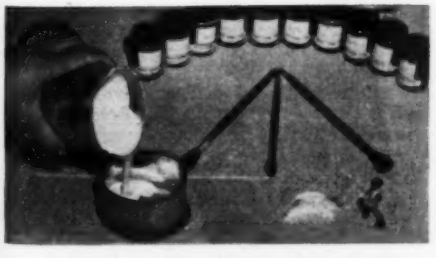


Fig. 2. Pouring the plaster

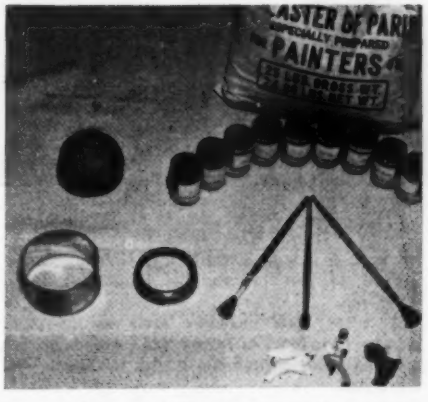


Fig. 1. Materials needed

The project is useful in making ceramic jewelry or in applying decoration to larger ceramic pieces.

A. Materials and equipment needed (Fig. 1):

1. A form. This may be an old metal, plastic, or ceramic pin, or it may be an original modeled piece.
2. A small piece of glass.
3. A tuna fish can with bottom removed or the ring from an easy seal jar.
4. A few pounds of plaster of Paris or potter's plaster.
5. Brushes.
6. Slip colors.
7. Fine white modeling or jewelry clay.

B. Procedure:

1. Prepare the form. The object used must have *draft*, that is, it must contain no undercuts. If there are undercuts on the object they may be corrected by filling them with plastic clay.
2. Place the form face up on a piece of glass. If the form you are using contains a pin back or catch, then you must place the form on plastic clay instead of glass. Place the tuna can over the object. Seal the outer edges with soft clay to prevent the plaster from leaking. If the form is made of metal it must first be sized with slip or liquid soap. Plaster will not stick to glass or clay form.
3. Mix the plaster and pour over the form, filling the can. It is advisable to mix the plaster in a tin can which can be thrown away after use (Fig. 2).
4. Let the plaster set before removing the form. This mold may be used immediately, but works better after it is thoroughly dry.
5. Do not remove the can from the mold to prevent the edges from chipping off the plaster.
6. After the mold has become thoroughly dry it may be used as a one-piece solid cast pour mold.

C. Procedure for use of press mold:

1. Pinch off a small piece of clay about twice the size of the form. Press the clay firmly into the mold being sure to get it in all corners (Fig. 3).
2. With a sharp knife cut off all excess clay even with the top of the mold. Be careful not to lift out the clay while cutting (Fig. 4).
3. Take a small piece of moist clay and attach it to the form and lift out carefully making sure all corners are free. When the form is finally removed a slight twisting motion will remove the small ball of attached clay (Fig. 5).
4. Smooth up the piece with a brush dipped in water. If the piece contains too many cracks do not try to patch it. Discard it and press out a new one using more pressure. It will also help if you smooth out the clay before you press it in the mold (Fig. 6).
5. The piece is now ready to be decorated or applied as a decoration to a larger piece.
6. Dry the piece thoroughly.
7. Bisque fire to maturing temperature.
8. Glaze with a transparent glaze and refire. If the piece is to be used as a pin it is better not to glaze the back. It is easier to cement a pinback to an unglazed area.
9. Attach the pinback with ceramic cement or clear airplane cement.

Fig. 3. Pressing the clay into the mold

Fig. 4. Cutting off excess clay

Fig. 5. Removing the piece

Fig. 6. Smoothing up

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A general information book on pottery, containing all fundamental processes and procedures. Written in a manner that makes interesting reading for persons just slightly interested in ceramics. Also contains hints on designing or judging good pottery pieces. Excellent plates of classical pottery (museum) pieces are included.

De Sager, Walter A., *Making Pottery* (New York: The Studio Publications, 1934), 96 pp.

Contains a good introduction to the history of pottery, giving various picture examples of the different types of early ware. The instructional part of the book is based on "seeing." Each step in a process is pictured with a short explanation accompanying each photograph.

De Vegh & Mandi, *The Craft of Ceramics* (New York: D. Van Nostrand Co., Inc., 1949), I–XI, 145 pp.

A recent book including some of the more popular techniques of flower making and figurine painting. Also includes standard methods. Well illustrated.

Divine, J. A. F., and Blackford, G., *Pottery Craft* (Peoria: The Manual Arts Press, 1939), I–XVI, 185 pp.

A concise book written by two instructors of English schools. Many detailed drawings but no photographs included. Contains only accepted fundamental material usable on a high school level.

Dougherty, John, *Pottery Made Easy* (Milwaukee: The Bruce Publishing Co., 1939), I–XI, 179 pp.

A clearly written, easy to follow book covering all the essential processes that are taught in school ceramics. Each process is divided into operations with each step in the operation numbered. Well illustrated.

Duncan, Julia H., and D'Amico, Victor, *How to Make Pottery and Ceramic Sculpture* (New York: Museum of Modern Art), distributed by International Textbook Co.

An excellent book for beginners contains the best of photographs showing the simple processes for hand sculpture, coil, slab, press molding, and pinching.

Gall, Irma M., and Van Etta, Vivian M., *The Art of Pottery* (Milwaukee: The Bruce Publishing Co., 1930), 80 pp.

A book written to be used in a ninth-grade class in art work in the field of ceramics. Divided into lessons rather than chapters. Includes many of the simple hand operations.

Honore, York, *Pottery Making From the Ground Up* (New York: The Viking Press, 1941),

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A short but interesting book on how to make pottery using only local clay, making simple glazes and making and firing an outdoor kiln.

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A book designed for a student's text. Standard in techniques and presentation. Covers all essential materials which should be taught in ceramic classes. Contains good illustrations. A good section on shop equipment.

Johnson, W. H., and Newkirk, Louis V., *The Ceramic Arts* (New York: The Macmillan Co., 1942), I–VIII, 158 pp.

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As the title suggests this book contains information on all phases of the pottery industry. It contains many excellent diagrams and photographs. It is simple enough for the beginner yet has much to offer the more advanced potter.

Lester, Katherine M., *Creative Ceramics* (Peoria: The Manual Arts Press, 1948), I–XIII, 211 pp.

A complete book on ceramic craft written by a person with considerable art training. Contains splendid information on tile making and decorating. Written for beginners.

Lunn, Dora, *Pottery In the Making* (Peoria: The Manual Arts Press, 1946), I-XII, 104 pp.

Written by an English potter and teacher. Miss Lunn's father was a potter and Miss Lunn had her own pottery, besides teaching the craft. Written to be used in the English schools, probably for the instructor.

Parmelee, Cullen W., *Ceramic Glazer* (Chicago: Industrial Publications, Inc., 1948), I–XII, 321 pp.

A technical book on glazer written for the engineering student. Contains good information on the elements used in ceramics, some common defects and ways of overcoming them. A good reference book, for a ceramic instructor.

Randall, R. H., *Ceramic Sculpture* (New York: Watson-Guptill Publications, Inc., 1948), I–VIII, 95 pp.

A book written for student of art wishing to express himself in the field of ceramics. Contains some of the newer techniques in hand building of ceramic pieces.

Ruescoe, William, *A Manual For The Potter* (New York: Transatlantic Arts, Inc., 1948), I–XI, 112 pp.

A general instruction book for student and teacher. Contains many fine photographs of industrial processes, and methods. Written by an English potter with 25 years' experience.

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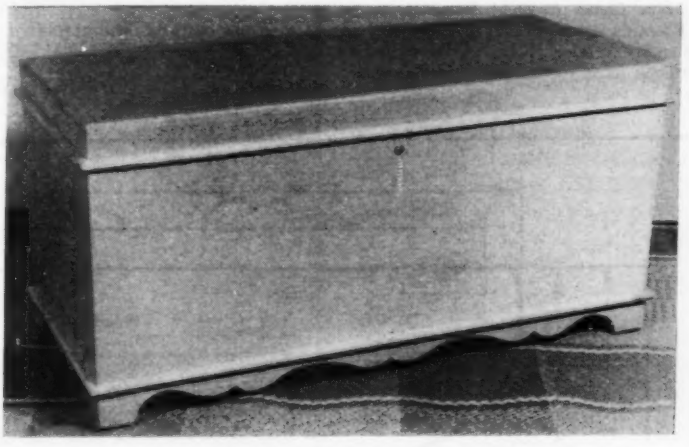
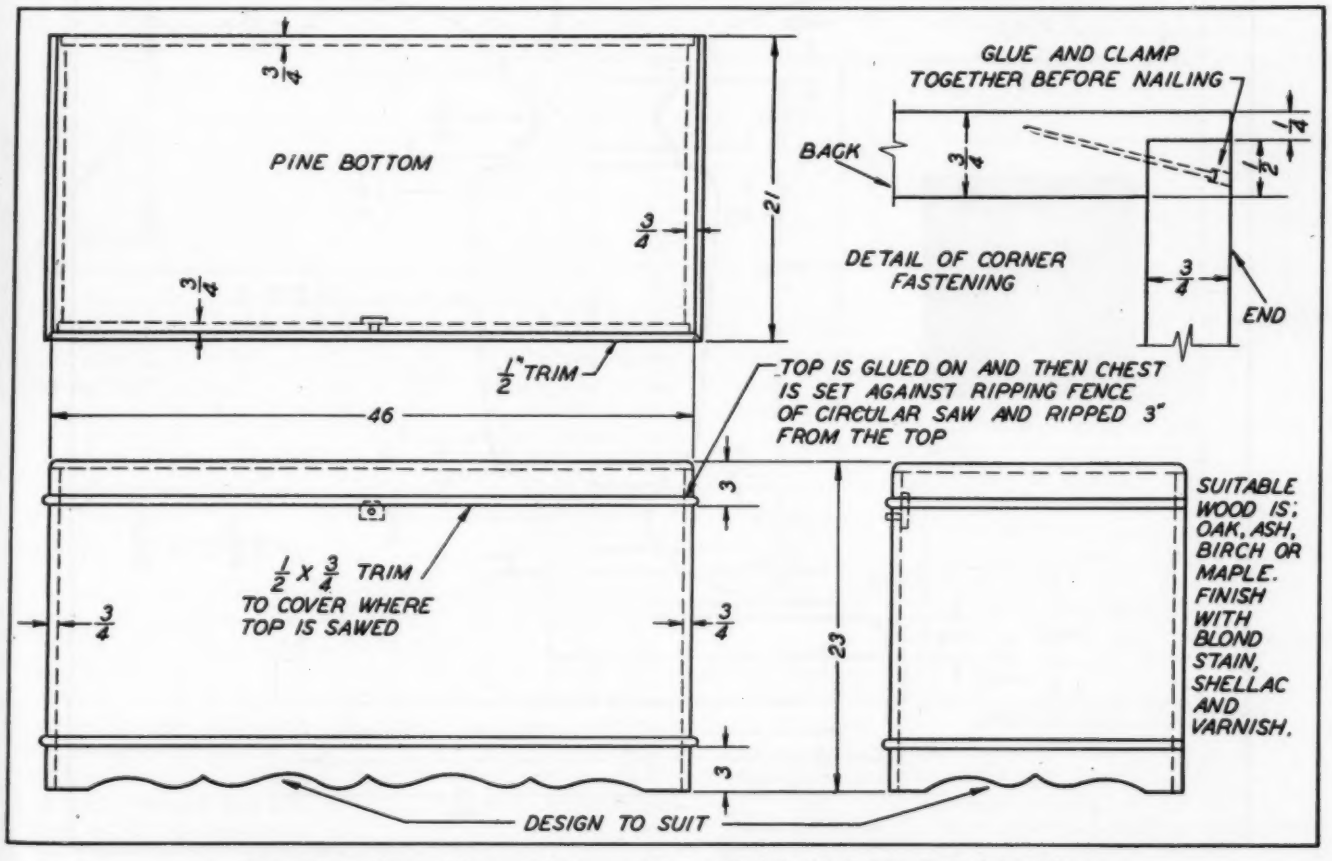


Blond hope chest by Louis Barocci



Blond hope chest. Submitted by Louis Barocci, Cudahy High School, Cudahy, Wis.

PRESS MOLD — BIBLIOGRAPHY

(Continued from previous page)

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A book written especially for beginners and hobby potters. Contains many drawings for making flowers, ceramic jewelry, and plates without extensive use of molds.

Snively, R. D. and M. E., *Pottery* (New York: Stephen Daye Press, 1940), 87 pp.

A very short book illustrated with full size pictures. Large portion of it is given over to wheel work.

Stratton, Mary Chase, *Ceramic Processes* (Ann Arbor: Edwards Brothers, 1941), 77 pp.

An elementary ceramic book not written in regular textbook form. Contains freehand sketches of objects to be made.

Svec, J. J., *Pottery Production Processes* (Chicago: Ceramic Industry, 1946), I–XIX, 70 pp.

A good book for a reference book in teaching related material. Contains many excellent photographs of industrial processes and methods. Contains technical advice on firing defects.

Turoff, Muriel Pargh, *Pottery and Other Ceramic Ware* (New York: Crown Publishers, 1949), I–XI, 145 pp.

Written for beginners by an instructor who has worked with evening classes and students in Veterans Administration Hospital.

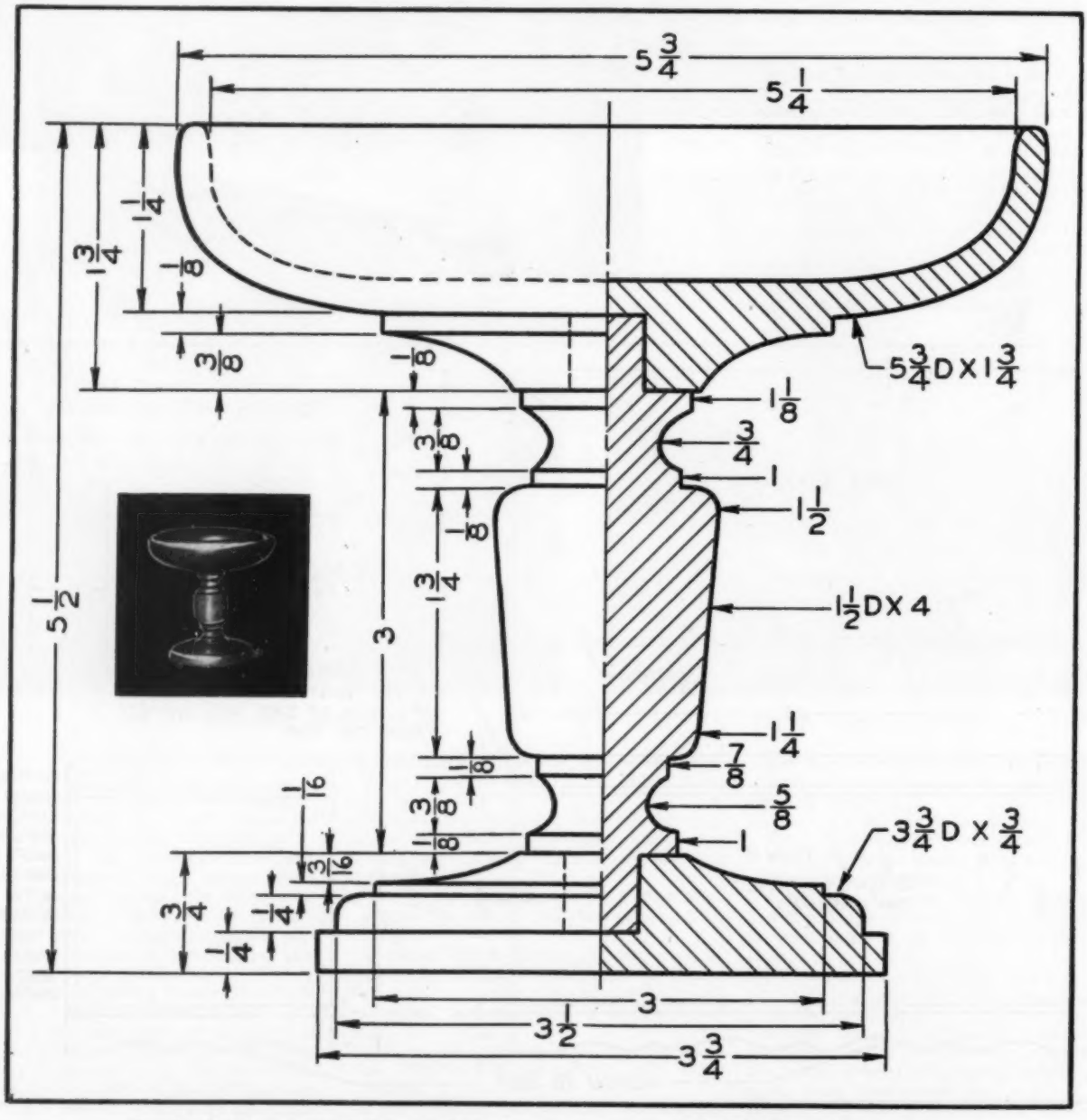
U. S. refineries have a combined capacity to process 7,230,000 barrels of crude oil per day. — *Petroleum Newsnotes*, American Petroleum Institute, New York City.

The cheapest piece of manufactured material that can be bought in the size of a railroad tie is wood. — *Natl. Lumber Mfg. Assn.*

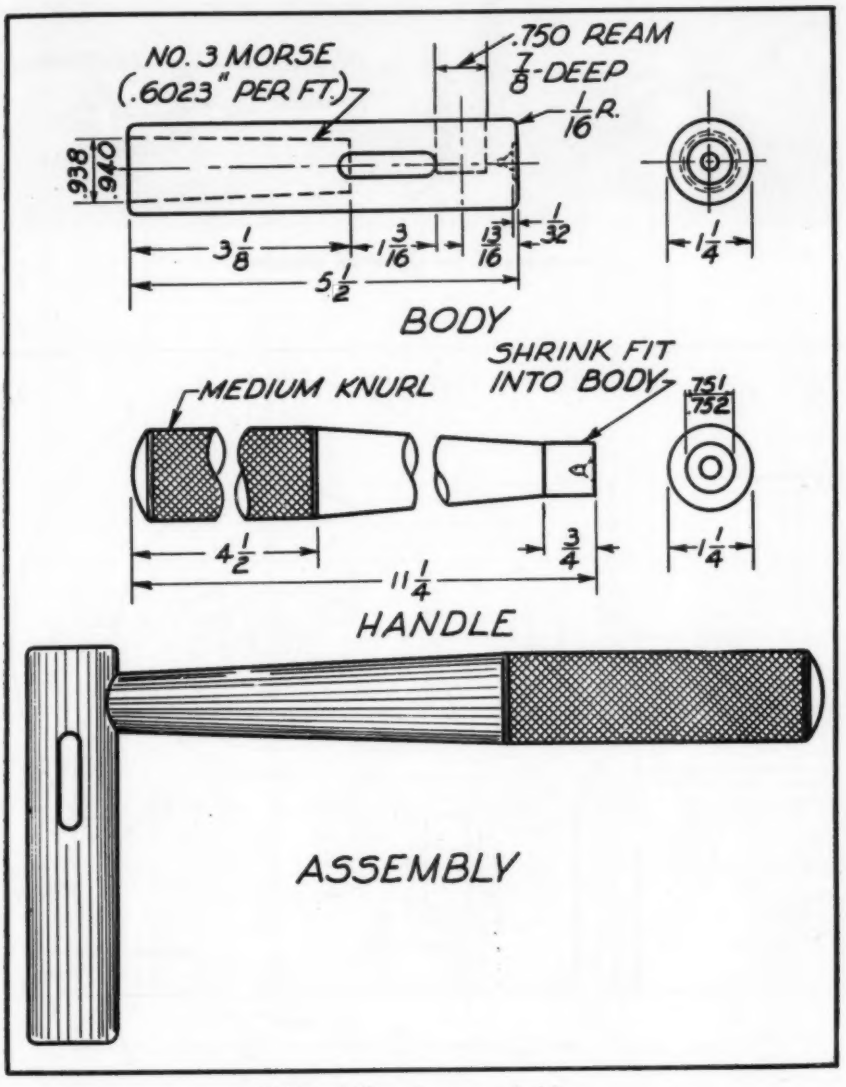
SAFETY DRILL AND REAMER HOLDER

WARREN D. CONRAD
U. S. Educational Foundation
American Embassy
Philippines

For holding Morse taper shank drills and reamers, the holder described in this article furnishes a simple, safe, and efficient means



Candy dish by James E. Seitz, industrial arts instructor, High School, Huntington, Pa.



Safety drill and reamer holder

when using them on the lathe. Its use will eliminate drill breakage, mutilation of drill shanks and sockets, and injury to the operator.

Procedure — Body

1. Select and cut 1⅞-in. dia. mild steel stock to a 5⅝-in. length.
2. Chuck and face one end.
3. Center drill.
4. Drill to 3⅛-in. depth using a pilot drill.
5. Drill to 3⅛-in. depth using ¾-in. drill.
6. Make compound calculations to bore a No. 3 Morse socket.
7. Set compound to required angle.
8. Set up lathe for boring. Use largest diameter boring bar possible.
9. Take successive trial cuts in the drilled hole using compound hand feed until a No. 3 Morse test plug can be inserted.
10. Check bore and make compound adjustment if necessary.
11. Continue boring cuts, checking and readjusting until test plug fits without *shake*, and a depth of 3⅛ in. has been reached. Use a No. 3 Morse finishing reamer if available.
12. File the 1/16-in. radius as shown.
13. Remove from chuck.
14. Tightly clamp scrap stock having a diameter of 1 in. or more in chuck. At least 3½ in. should protrude from the chuck jaws.
15. Make compound calculations to turn a No. 3 Morse plug.
16. Set compound to required angle. If possible use the compound setting used when boring the body. Time consumed in making trial cuts will be avoided.
17. Take successive trial turning cuts using compound hand feed until the body socket can be slipped over the plug.
18. Check the taper and make compound adjustment if necessary.
19. Continue turning cuts, checking, and readjusting the compound until the body socket fits the plug without *shake*. NOTE: The large end of plug should be .930/.935 in.
20. Lightly polish the plug.
21. Drive the body on plug with a single tap using a soft hammer.
22. Turn the 1¼ diameter. NOTE: Do not take heavy cuts or the body may loosen on the plug.
23. Face to length.
24. File the 1/16 radius.
25. Center drill.
26. Relieve center 1/32 in.
27. Polish entire body.
28. Remove plug from chuck.
29. Remove body from plug.
30. Lay out tang hole.
31. Drill tang hole for milling.
32. End mill tang hole. NOTE: If a milling machine is not available, the tang hole may be finished by filing.
33. Lay out handle hole.
34. Drill and ream handle hole 0.750 in. dia.
35. Clean machine and equipment. Return tools and accessories to proper storage.

Handle

1. Select and cut mild steel stock to 11¾-in. length.
2. Face and center drill both ends.
3. Mount on dog between accurate centers.
4. Turn the right hand diameter end that is to be knurled for a distance of at least 6 inches.
5. Knurl.
6. Reverse the work in the lathe. NOTE: Protect knurl by using soft metal under dog screw.
7. Turn the .751/.752 diameter to a length of 0.760 in.
8. Calculate tailstock offset dimension.
9. Turn taper to dimension.
10. Turn and polish the .751/.752 diameter. Chamfer end 1/32 inch.
11. Remove work from lathe.
12. Lay off length to 11¼ in.
13. Mount in four jaw chuck accurate to .005 in.
14. Face the length.
15. Turn the 1-in. radius.
16. Remove work from lathe.
17. Have both body and handle checked by instructor.
18. Press handle into body.
19. Clean machine and equipment. Return tools and accessories to proper storage.

UNIVERSAL MANDREL

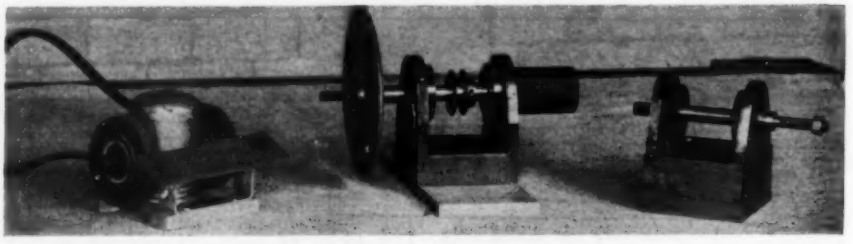
WALTER O. HAYES
Roosevelt High School
Des Moines, Iowa

The project described herewith presents many valuable learning elements and has many uses which satisfy a number of home

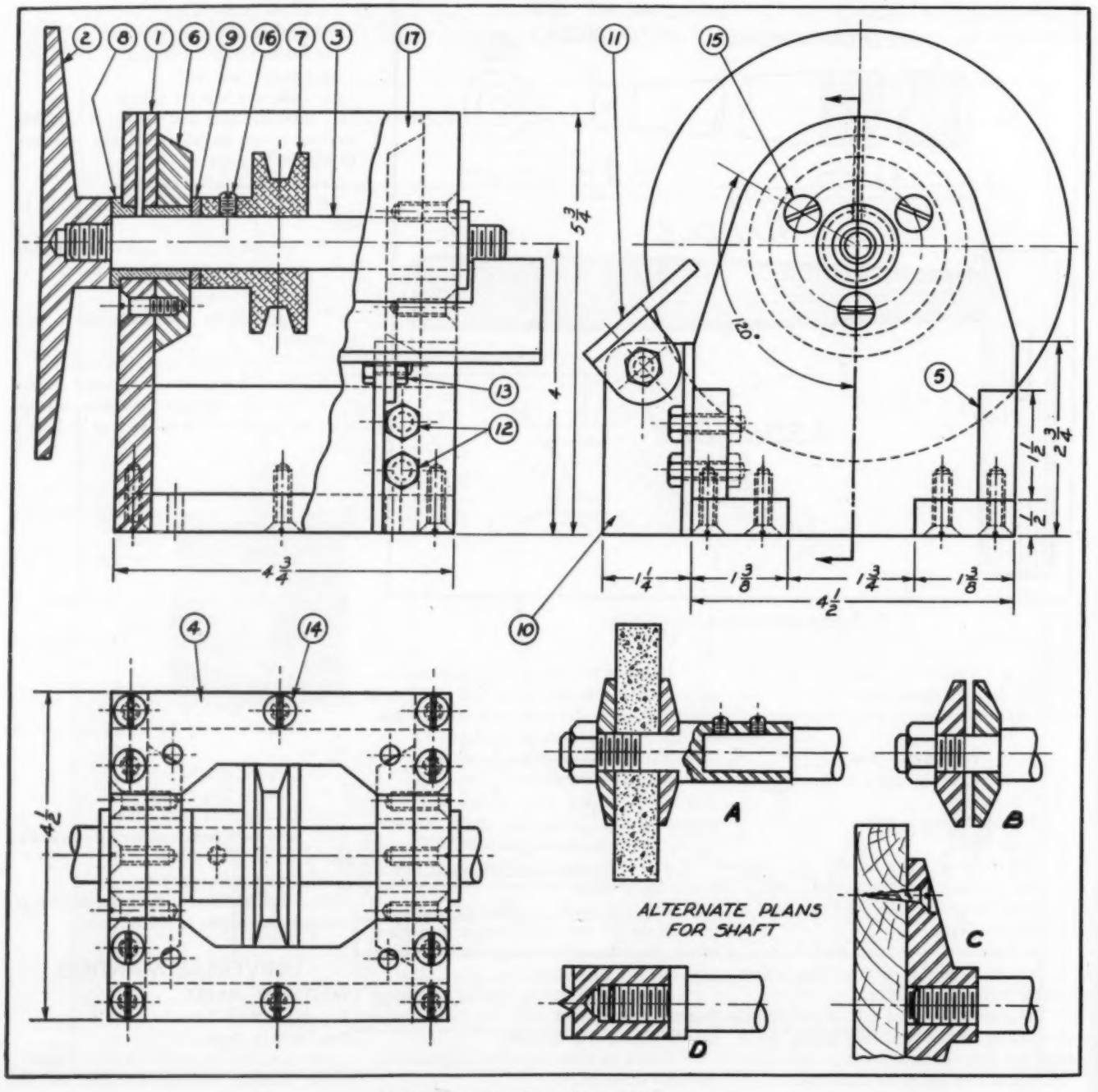
shop needs. The mandrel with the exception of the shaft, can be made entirely with hand tools, but it is better to make it a machine-shop project. The finished mandrel may be adapted for use as a grinder, circular saw, disk sander, drum sander, drill press, lathe head stock, or buffer.

Construction

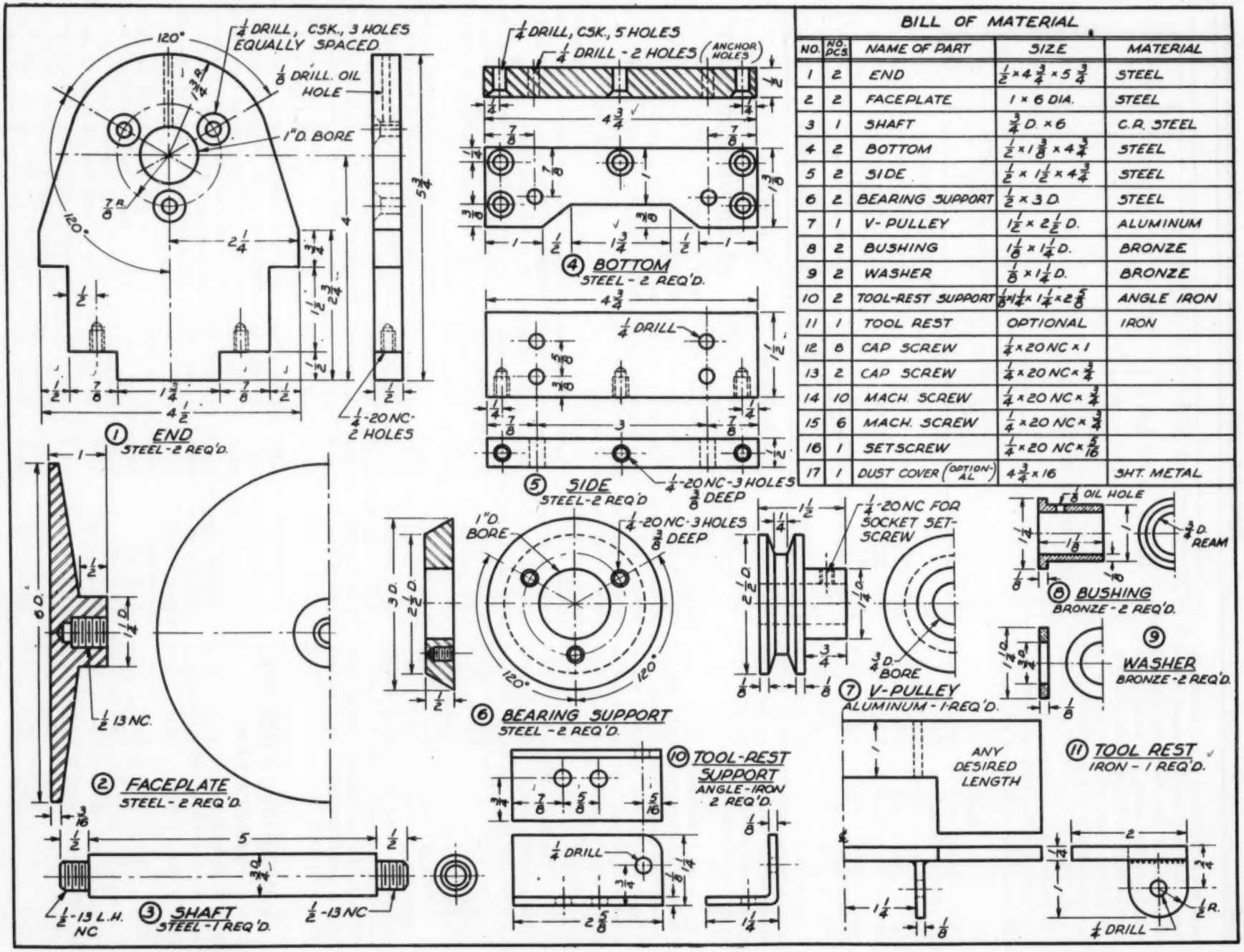
Because the potential uses and construction tools are varied the variable details are some-



Two types of the universal mandrel



Assembly of universal mandrel



BILL OF MATERIAL

NO.	NO. PCS.	NAME OF PART	SIZE	MATERIAL
1	2	END	$\frac{1}{2} \times 4\frac{3}{4} \times 5\frac{3}{4}$	STEEL
2	2	FACEPLATE	1 × 6 DIA.	STEEL
3	1	SHAFT	$\frac{3}{4}$ D. × 6	C.R. STEEL
4	2	BOTTOM	$\frac{1}{2} \times 1\frac{3}{8} \times 4\frac{3}{4}$	STEEL
5	2	SIDE	$\frac{1}{2} \times 1\frac{1}{2} \times 4\frac{3}{4}$	STEEL
6	2	BEARING SUPPORT	$\frac{1}{2} \times 3$ D.	STEEL
7	1	V-PULLEY	$1\frac{1}{2} \times 2\frac{1}{2}$ D.	ALUMINUM
8	2	BUSHING	$1\frac{1}{8} \times 1\frac{1}{4}$ D.	BRONZE
9	2	WASHER	$\frac{1}{8} \times 1\frac{1}{4}$ D.	BRONZE
10	2	TOOL-REST SUPPORT	$\frac{1}{8} \times 1\frac{1}{4} \times 2\frac{5}{8}$	ANGLE IRON
11	1	TOOL REST	OPTIONAL	IRON
12	8	CAP SCREW	$\frac{1}{4}$ × 20 NC × 1	
13	2	CAP SCREW	$\frac{1}{4}$ × 20 NC × $\frac{3}{4}$	
14	10	MACH. SCREW	$\frac{1}{4}$ × 20 NC × $\frac{3}{4}$	
15	6	MACH. SCREW	$\frac{1}{4}$ × 20 NC × $\frac{3}{4}$	
16	1	SETSCREW	$\frac{1}{4}$ × 20 NC × $\frac{5}{16}$	
17	1	DUST COVER (OPTIONAL)	$4\frac{3}{4} \times 16$	SHT. METAL

Details of universal mandrel

times left to the choice of the builder. The various shaft plans may be designed to meet many uses. The metal dust cover is entirely optional. Sanding tables and grinder guards must be built to fit the attachments used.

The ½-in. boiler plate used may be cut to shape with hack saws, band saws, or with a torch. The edges may be smoothed with files, grinders, or a cutting machine.

Screw holes are best drilled on a drill press, and tapped while the pieces are held in place.

Bearings

The 3-in. disk used for bearing support was added to strengthen the bearings and to permit the use of either bushings, ball bearings, or roller bearings. If bronze bushings are used they should be drilled and pinned in place to prevent their rotation from cutting off the oil holes.

The holes for bronze bushings should be drilled, or bored, after the mandrel ends are fastened to the sides and bottom, or else reamed to final size, to prevent binding and assure proper alignment. Boring may be done on the lathe or drill press.

Assembly

Although machine screws may be used for assembly, this mandrel is easier to build and is more rigid if it is welded or brazed, instead. Proper care must be exercised to prevent excessive warping if the mandrel is welded together.

The Piston Mandrel

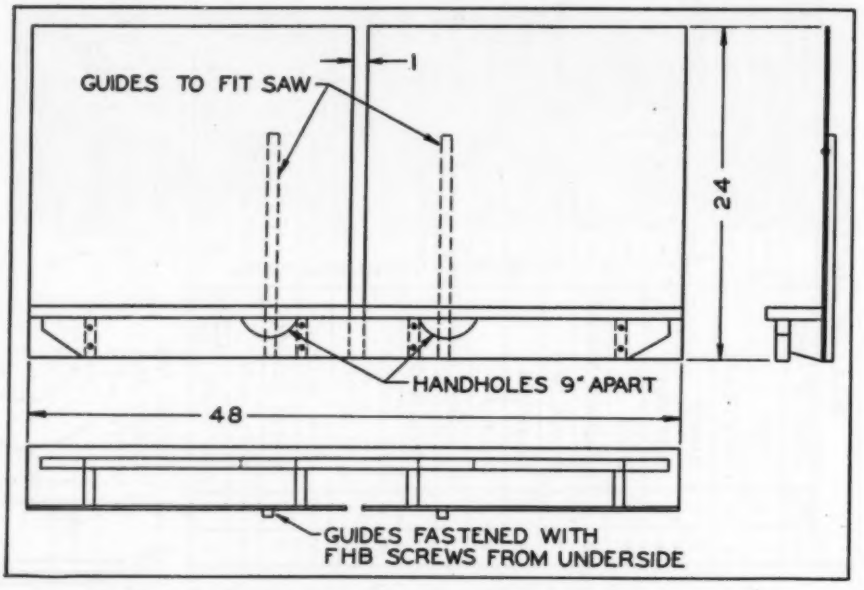
This mandrel is simple to make, but serves much the same purpose as the one shown in the plans. A slot cut down one side allows the belt to run back instead of up. The wrist-pins were replaced with bronze bushings drilled and pinned in place. Oil holes were drilled from the top on the inside. The shaft is made like the one shown in the detail drawing, except that the length must be altered. A turned wooden cap excludes dust and grit. Tool rests or sander tables may be made to meet specific needs.

CROSSCUTTING FENCE FOR VARIETY SAW

PAUL E. POWELL
Associate Professor of Industrial Arts
East Carolina College
Greenville, N. C.

The variety saw crosscutting fence shown here may be in use in shops other than the one at East Carolina College, but if so, it has never before been given the publicity it deserves.

For crosscutting wide boards or long unwieldy pieces this aid has been tested and found to be excellent.



Variety saw crosscutting fence

By making the fence longer and larger it has been found that the job of managing long pieces is made easier and much more safe. The fence shown, having a large bearing surface, can accommodate boards up to 24 in. in width. The usual crosscutting fence that is standard equipment with the saw accommodates widths up to 12 in. before it no longer bears on the table. Here at East Carolina, when bench tops were made for our old woodworking benches, the enlarged fence shown was used to trim the ends square. When using the *standard equipment* fence the operator must reverse the fence to crosscut wide pieces. With the one shown this is not necessary but it can be used in that position for extremely wide pieces.

There is one fault with this fence, if it can be considered a fault, and that is that since the work rests on plywood ¼ in. thick, the maximum thickness which the saw will cut is reduced by a quarter of an inch.

In 50 years the American work week has shrunk from sixty hours to forty. But in the meantime production per man has multiplied five times. The Chamber of Commerce of the United States says the reason is to be found in labor saving machinery and in better planning and management. Also, today's workmen are better trained and more intelligent. — *Business News Features.*

* * *

An overwhelming majority of motor vehicles involved in accidents last year were reported in apparently good condition.

BOARD MEASURE CHART

TROY C. BOND
Assistant Principal
Dallas Vocational School
Dallas, Tex.

A board measure chart similar to the one worked out by students in a cabinetmaking class at the Dallas Vocational School under George F. Sansom, instructor, is very helpful in any woodworking class.

Individual charts may be duplicated for each student's use, or a large chart can be prepared in the drafting room for bulletin board use.

Preparation of the chart as shown grew out of a need which developed in the vocational school class. In figuring cost of materials, students were permitted to construct projects from lumber in the school supply room and pay for the total amount of board feet actually used. Pieces were invariably *odd* sizes. Ordinary charts of this type which were available were useless for this purpose.

By working out the problems or answers for the chart, all members of the class became familiar with the method for determining board measure.

Use of the chart increased both speed and accuracy.

Two sizes, thickness and width, are shown in the left hand column. Varying lengths from 6 to 18 in. are indicated across the top. Answers in board feet are shown in appropriate squares. For example, a piece of stock 2 by 5 in., 14 in. long, contains .97 board foot.

Percentages for waste can be added very easily either to the total amount of material used or to the unit cost.

BOARD MEASURE CHART

$$\text{B. F.} = \frac{\text{T}'' \times \text{W}'' \times \text{L}''}{144}$$

Size of Lumber	LENGTH OF LUMBER (L)												
(T x W)	6"	7"	8"	9"	10"	11"	12"	13"	14"	15"	16"	17"	18"
1" x 1"	.04	.05	.06	.06	.07	.08	.08	.09	.10	.10	.11	.12	.12
1" x 2"	.08	.10	.11	.12	.14	.15	.17	.18	.19	.21	.22	.23	.25
1" x 3"	.13	.15	.17	.19	.21	.23	.25	.27	.29	.31	.33	.35	.37
1" x 4"	.17	.19	.22	.25	.28	.31	.33	.36	.39	.42	.44	.47	.50
1" x 5"	.21	.24	.28	.31	.35	.38	.42	.45	.49	.52	.56	.59	.62
1" x 6"	.25	.29	.33	.37	.42	.46	.50	.54	.58	.62	.67	.71	.75
1" x 7"	.29	.34	.39	.44	.49	.53	.58	.63	.68	.73	.78	.83	.87
1" x 8"	.33	.39	.44	.50	.56	.61	.67	.72	.78	.83	.89	.94	1.00
1" x 9"	.37	.44	.50	.56	.62	.69	.75	.81	.87	.94	1.00	1.06	1.12
1" x 10"	.42	.49	.56	.62	.69	.76	.83	.90	.97	1.04	1.11	1.18	1.25
1" x 11"	.46	.53	.61	.69	.76	.84	.92	.99	1.07	1.15	1.22	1.30	1.37
1" x 12"	.50	.58	.67	.75	.83	.92	1.00	1.08	1.17	1.25	1.33	1.42	1.50
2" x 2"	.16	.19	.22	.25	.28	.30	.33	.36	.39	.42	.44	.47	.50
2" x 3"	.25	.29	.33	.37	.42	.46	.50	.54	.58	.62	.67	.71	.75
2" x 4"	.33	.39	.44	.50	.56	.61	.67	.72	.78	.83	.89	.94	1.00
2" x 5"	.42	.49	.56	.62	.69	.76	.83	.90	.97	1.04	1.11	1.18	1.25
2" x 6"	.50	.58	.67	.75	.83	.92	1.00	1.08	1.17	1.25	1.33	1.42	1.50
2" x 7"	.58	.68	.78	.87	.97	1.07	1.17	1.26	1.36	1.46	1.56	1.65	1.75
2" x 8"	.67	.78	.89	1.00	1.11	1.22	1.33	1.44	1.56	1.67	1.78	1.89	2.00
2" x 9"	.75	.88	1.00	1.13	1.25	1.38	1.50	1.63	1.75	1.88	2.00	2.13	2.25
2" x 10"	.83	.97	1.11	1.25	1.39	1.53	1.67	1.81	1.94	2.08	2.22	2.36	2.50
2" x 11"	.92	1.07	1.22	1.38	1.53	1.68	1.83	1.99	2.14	2.29	2.44	2.60	2.75
2" x 12"	1.00	1.17	1.33	1.50	1.67	1.83	2.00	2.17	2.33	2.50	2.67	2.83	3.00
3" x 3"	.38	.44	.50	.56	.63	.69	.75	.81	.88	.94	1.00	1.06	1.13
3" x 4"	.50	.58	.67	.75	.83	.92	1.00	1.08	1.17	1.25	1.33	1.42	1.50
3" x 5"	.63	.73	.83	.94	1.04	1.15	1.25	1.35	1.46	1.56	1.67	1.77	1.88
3" x 6"	.75	.88	1.00	1.13	1.25	1.38	1.50	1.63	1.75	1.88	2.00	2.13	2.25
3" x 7"	.87	1.02	1.17	1.31	1.46	1.60	1.75	1.90	2.04	2.19	2.33	2.48	2.62
3" x 8"	1.00	1.17	1.33	1.50	1.67	1.83	2.00	2.17	2.33	2.50	2.67	2.83	3.00
3" x 9"	1.13	1.31	1.50	1.69	1.88	2.06	2.25	2.44	2.63	2.81	3.00	3.19	3.38
3" x 10"	1.25	1.46	1.67	1.87	2.08	2.29	2.50	2.71	2.92	3.12	3.33	3.54	3.75
3" x 11"	1.38	1.60	1.83	2.06	2.29	2.52	2.75	2.98	3.21	3.44	3.67	3.90	4.13
3" x 12"	1.50	1.75	2.00	2.25	2.50	2.75	2.98	3.21	3.44	3.75	4.00	4.25	4.50
4" x 4"	.67	.78	.89	1.00	1.11	1.22	1.33	1.44	1.56	1.67	1.78	1.89	2.00
4" x 5"	.83	.97	1.11	1.25	1.39	1.53	1.67	1.81	1.94	2.08	2.22	2.36	2.50
4" x 6"	1.00	1.17	1.33	1.50	1.67	1.83	2.00	2.17	2.33	2.50	2.67	2.83	3.00
4" x 7"	1.17	1.36	1.56	1.75	1.94	2.14	2.33	2.53	2.72	2.92	3.11	3.31	3.50
4" x 8"	1.33	1.56	1.78	2.00	2.22	2.44	2.67	2.89	3.11	3.33	3.56	3.78	4.00
4" x 9"	1.51	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75	4.00	4.25	4.50
4" x 10"	1.67	1.94	2.22	2.50	2.78	3.06	3.33	3.61	3.89	4.17	4.44	4.72	5.00
4" x 11"	1.83	2.14	2.44	2.75	3.06	3.36	3.67	3.97	4.28	4.58	4.89	5.19	5.50

Teaching Materials For Industrial Education

CHRIS H. GRONEMAN
Head, Industrial Education Department
School of Engineering
The Agricultural and Mechanical College of Texas
College Station, Tex.

(Continued from page 27A of the June, 1952, issue)

Frank Paxton Lumber Company
5701 W. 66th St.
Chicago 38, Ill.
Box 1676
Denver, Colo.
Box 683
Des Moines, Iowa
Box 1225
Forth Worth, Texas
210 Dwight Bldg.
Kansas City 6, Mo.

Because of an oversight the following publications had not been listed in this article before:

Safety Rules for the Safe Operation of Power Woodworking Tools, 5 cents per copy.

Beautiful Woods, $1 per copy.

Write for these items to the nearest Frank Paxton Lumber Company's yard.

United States Bureau of Mines
Graphic Services
4800 Forbes Street
Pittsburgh 13, Pa.

Ohio and Its Mineral Resources, 16mm. sound, color, 29 min.

United States Government Printing Office
Superintendent of Documents
Washington 25, D. C.

Directory of 897 16mm. Film Libraries (Office of Education), Cat. No. FS 5.3:949/10, 15¢

Forest Service Films available on loan for educational purposes, 1951, Cat. No. A 13.2:F 48/951, 5¢

Guide to U. S. Government Motion Pictures, v. 1, No. 1, June, 1947, Cat. No. LC 1.2:M 85/v.1, No. 1 (Library of Congress), 40¢

Motion Pictures of Department of Agriculture, 1951 (with numerical list of slide films), Cat. No. A 1.76:14, 25¢

102 Motion Pictures on Democracy, 16mm. sound films selected and received by Office of Education Advisory Committee, Cat. No. FS 5.3:950/1, 20¢

Slidefilms of the U. S. Department of Agriculture, Cat. No. A 1.76:17, 10¢

United States Government and Pan American Union, motion pictures on other American republics (Office of Education), Cat. No. FS 5.4:275/2, 15¢

Acoustic Performance of 16mm. Sound Motion-picture Projectors, Cat. No. C 13.4:439, 15¢

Motion Picture Equipment, chap. 85, Bureau of Ships Manual, Cat. No. M 210.8:85/949, 15¢

Movie Projectors in Public High Schools, Cat. No. FS 5:17:109, 15¢

Optican and Mechanical Characteristics of 16mm. Motion Picture Projectors, Cat. No. C 13.4:437, 10¢

Training Film and Film Strip Projection, Cat. No. W 1.35:11-401, 15¢

United World Films, Inc.
1445 Park Avenue
New York 29, N. Y.

Instructional Films Catalog

Films in the National Emergency, Supervision, Key to Manpower Utilization (a bulletin)

Films for School and Industry, 16mm. motion pictures and 35mm. film strips (a bulletin)

Films in the National Emergency, Engineering, America's "Know How" (a bulletin)

Petroleum Geology, 16mm. sound, black and white, 30 min., rental $4.50

University of Kansas
Bureau of Visual Instruction
University Extension
Lawrence, Kans.

All 16mm. sound motion pictures — sf means Service Fee

Magic of Coal, sf 75¢

Evolution of the Oil Industry, sf $1

Freedom Rides on Rubber, sf $1

Industrial Revolution, sf $1.25

Modern Coal Mining, sf 75¢

Mountains of Marble, sf 75¢

Oil for Tomorrow, color, sf $1

Peat and Coal, sf $1

Petroleum, sf $1.25

Petroleum and Its Uses, sf $1

Sulphur and Its Compounds, color, sf 75¢

Story of Wheat, sf $1.25

Venard Organization, The
Peoria 2, Ill.

The Nunn-Bush Share-the-Production-Plan, sound, color, 22 min.

Hoosier Hot Shots, 16mm. sound, 13 min.

Vermont Marble Company
1513 Wall Street
Dallas 2, Tex.

Cavalcade of Marble, technicolor, 27 min., 16mm. projector with sound track

Western Oil and Gas Association
510 West Sixth Street
Los Angeles 14, Calif.

Oil for Tomorrow, 16mm. sound, color, 30 min.

METALS

Allis-Chalmers Mfg. Company
Advertising and Industrial
Press Department
Milwaukee 1, Wis.

Metal Magic, 16mm. sound, color, 12 min.

Aluminum Company of America
Motion Picture Section
818 Gulf Building
Pittsburgh 18, Pa.

The following are available in 16mm. and 35mm. widths for sound-picture projectors and cannot be shown on silent equipment.

Unfinished Rainbows, 37 min.

Curiosity Shop, 30 min.

This is Aluminum, 30 min.

The Davenport Story, 22 min.

Dateline Tomorrow, 19 min.

How to Form Aluminum — General Metal Practice, 20 min.

How to Form Aluminum — Blanking and Piercing, 15 min.

How to Form Aluminum — Drawing, Stretch and Stamping, 22 min.

How to Form Aluminum — Tube and Shape Bending, 13 min.

How to Form Aluminum — Spinning, 16 min.

How to Machine Aluminum, 32 min.

How to Weld Aluminum — Arc Welding, 10 min.

How to Weld Aluminum — Torch Welding, 17 min.

How to Weld Aluminum — Resistance Welding, 12 min.

How to Braze Aluminum, 7 min.

How to Rivet Aluminum, 26 min.

Alcoa Library Sound Motion Pictures, Visual Aids, Booklets

American Institute of Steel Construction, Inc., The
101 Park Avenue
New York 17, N. Y.

The Backbone of Progress, 35mm. with sound, 16mm. with or without sound, 30 min.

Steel, 16mm. sound, 20 min.

Empires of Steel, 16mm. silent, 40 min.

Bridging Marble Canyon, 16 mm. sound, 10 min.

Span Supreme, 35mm. silent, 60 min.

Bridging a Century, 16mm. with sound, 45 min.

Build with Steel, 16mm. sound, color, 25 min.

Slides and Pictures — Lantern slides 3¼" x 4" are available in a wide range of subjects, dealing with structural steel and its uses. A list of some thirty subjects, comprising over 1000 slides, suitable for lecture work, may be obtained on application to the institute.

Anaconda Copper Mining Company
Advertising Department
25 Broadway
New York 4, N. Y.

Operations of the Cananea Consolidated Copper Company, S.A., 16mm. sound, natural color, 21 min.

Open-Pit Copper Mining in Chile, 16mm. sound, Kodachrome, 16 min.

Nerves of the Nation, 16mm. sound, Kodachrome, 30 min.

Copper Mining, Smelting and Refining, 16mm. sound, Kodachrome, 35 min.

Bullard Company, The
Bridgeport 2, Conn.

Wheels for the Railroads, 16mm. sound, 14 min.

Man-Au-Trol — Master of the Machine, 16mm. sound, black and white, 27 min.

Three for One, 16mm. sound, black and white, 18 min.

Bullard Pioneers — Interchangeability Without Jigs, 16mm. sound, black and white, 15 min.

Cincinnati Milling and Grinding Machines, Inc., The
Cincinnati 9, Ohio

Highway to Production, 16mm. sound, Kodachrome, 30 min.

Age of Precision, 16mm. sound, Kodachrome, 30 min.

Cleveland Twist Drill Company, The
1902 North Field Street
Dallas 1, Tex.

The Uses and Abuses of Twist Drills, 16mm. sound, 25 min.

Denver and Rio Grande Western Railroad
605 Rio Grande Building
1531 Stout Street
Denver 1, Colo.

Bonanza, 16mm. sound, color, 45 min.

DoAll Company, The
Des Plaines, Ill.

The Versatile Contour Saw, 16mm. sound, colored

Sawing An Internal Irregular Shape, 16mm. sound

Filing an Internal Irregular Shape, 16mm. sound

Gage Blocks & Accessories, 16mm. sound

How DoAll Gages Are Made, 35mm. sound slide film

How DoAll Gages Are Used, 35mm. sound slide film

Theory Behind the Use of Gages, 35mm. sound slide film

DoAll Precision Accuracy with the DoAll Inspection Laboratory, 35mm. sound slide film

Fellows Gear Shaper Company, The
78 River Street
Springfield, Vt.

The Art of Generating and Gear Manufacturing Equipment, two reel, 16mm. sound, color

General Electric Company
Distribution Section
Advertising and Sales Promotion Division
Schenectady 5, N. Y.

(Requests should be sent to nearest General Electric Company Office — obtain address from above office.)

Metal Magic, 16mm. sound, black and white, 10 min., No. S-2350

The Inside of Arc Welding, 16mm. sound, color, 6 parts, each 10 min.

This is Resistance Welding, 16mm. sound, color, 25 min., No. AS-2583

The Story of A-C Welding, 16mm. sound, color, 2 parts, each 10 min.

The Inside of Atomic-Hydrogen Arc Welding, 16mm. sound, color, 2 parts, each 10 min.

General Motors Corporation
Department of Public Relations — Film Section

General Motors Building
Detroit 2, Mich.

Requests from Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming address to:
General Motors Corporation
508 San Francisco Building
405 Montgomery Street
San Francisco 4, Calif.

Requests from Greater New York City and the communities of Long Island address to:
General Motors Corporation
Department of Public Relations
1775 Broadway
New York 19, N. Y.

The ABC of Hand Tools, 16mm. sound, color, Part I, 18 min., Part II, 15 min.
Quality in the Making, 16mm. sound, 23 min.
Micro Instrument Ball Bearings, Their Care and Handling, 16mm. sound, 22 min.
Precisely So, 16mm. sound, 18 min.
Oil Films in Action, 16mm. sound, color, 18 min.
Service Procedure for Ball Bearings, 16mm. sound, 20 min.
Machine Tools and Methods, 16mm. sound, 18 min.

International Acetylene Association
30 East 42nd Street
New York 17, N. Y.
The Oxy-Acetylene Flame — Master of Metals, 16mm. sound, color, 19 min. (Order from Bureau of Mines, Graphic Services Section, 4800 Forbes Street, Pittsburgh 13, Pennsylvania, weight 5 lbs. Send with order enough stamps to prepay parcel post charges from Pittsburgh.)

Kearney and Trecker Corporation
Milwaukee 14, Wis.
"Milling Practice," a training film in sound and color dealing with the fundamental principles of milling, 35mm. slide films, 16" records, 33 R.P.M.

Shell Oil Company, Inc.
500 West 50th Street
New York 20, N. Y.
or
100 Bush Street
San Francisco 6, Calif.
Lever-Age, 16mm. sound, black and white, 20 min.

South Bend Lathe Works
425 East Madison Street
South Bend 22, Ind.
Plain Turning, 16mm. sound, 800', 20 min.
The Lathe, 800' film, 16mm. sound, 20 min.
Grinding Cutter Bits, 16mm. sound, 800', 20 min.

Starrett Company, The L. S.
Athol, Mass.
The Tools and Rules for Precision Measuring, 16mm. sound, 30 min.

Texas Company, The
Houston 1, Tex.
Your Farm Workshop, 16mm. color, 18 min.

United States Bureau of Mines Experiment Station
4800 Forbes Street
Pittsburgh 13, Pa.
Copper Mining in Arizona, 16mm. silent, 3 reels, No. 165
Reel 1: Beginning of open-pit mining
Reel 2: Reforging, grinding and tempering
Reel 3: Underground Mining
Made in cooperation with Phelps Dodge Corporation
Copper Leaching and Concentration, 16mm. silent, 1 reel, No. 166
Made in cooperation with Phelps Dodge Corporation
Copper Smelting, 16mm. silent, 1 reel, No. 167
Made in cooperation with Phelps Dodge Corporation
Copper Refining, No. 168, 16mm. silent, 1 reel
Made in cooperation with Phelps Dodge Corporation
Fabrication of Copper, 16mm. silent, 3 reels, No. 169
Reel 1: Transportation of Copper
Reel 2: Braided Cotton being impregnated
Reel 3: Making and operation of oil-filled cable
Made in cooperation with Phelps Dodge Copper Products Corporation
The Making and Shaping of Steel — Raw Materials, 16mm. silent, 1 reel, No. 170
Made in cooperation with United States Steel Corporation
The Making and Shaping of Steel — the Making of Steel, 16mm. silent, 1 reel, No. 171
Made in cooperation with United States Steel Corporation
The Making and Shaping of Steel — Flat-Rolled Products, 16mm. silent, 1 reel, No. 172
The Making and Shaping of Steel — Bars and Structural Shapes, 16mm. silent 1 reel, No. 173
Made in cooperation with United States Steel Corporation
The Making and Shaping of Steel — Rails, Wheels, and Axles, 16mm. silent, 1 reel, No. 174
Made in cooperation with United States Steel Corporation
The Making and Shaping of Steel — Wire and Wire Products, 16mm. silent, 1 reel, No. 175
Made in cooperation with United States Steel Corporation
The Making and Shaping of Steel — Pipe and Tube Manufacture, 16mm. silent, 1 reel, No. 176
Made in cooperation with United States Steel Corporation
Alloy Metals — A Story of Their Development, 16mm. sound, No. x177
Made in cooperation with Climax Molybdenum Company
Nickel Mining, 16mm. sound, No. x179
Made in cooperation with the International Nickel Company, Inc.
Nickel Milling and Smelting, 16mm. sound, No. x180
Made in cooperation with the International Nickel Company, Inc.
A Story of Nickel Refining, 16mm. sound, No. x181
Made in cooperation with the International Nickel Company, Inc.
Lead Milling, Smelting and Refining, 16mm. sound, No. x184
Made in cooperation with St. Joseph Lead Company
Manufactured Abrasives, 16mm. sound, No. x185
Made in cooperation with the Carborundum Company
How to Machine Aluminum, 16mm. sound, No. x194
Made in cooperation with the Aluminum Company of America
How to Rivet Aluminum, 16mm. sound, No. x195
Made in cooperation with the Aluminum Company of America
Stainless Steel, 16mm. sound, No. x201
Made in cooperation with Allegheny Ludlum Steel Corporation
How to Form Aluminum — General Sheet Metal Practice, 16mm. sound, No. x204
Made in cooperation with the Aluminum Company of America
How to Form Aluminum — Blanking and Piercing, 16mm. sound, No. x205
Made in cooperation with the Aluminum Company of America
How to Form Aluminum — Tube and Shape Bending, 16mm. sound, No. x206
Made in cooperation with the Aluminum Company of America
How to Form Aluminum — Drawing, Stretching and Stamping, 16mm. sound, No. x207
Made in cooperation with the Aluminum Company of America
How to Form Aluminum — Spinning, No. x208, 16mm. sound
Made in cooperation with the Aluminum Company of America
Magnesium — Metal from the Sea, 16mm. sound, No. x209
Made in cooperation with Dow Chemical Company
A Story of Copper, 16mm. sound, No. x213
Made in cooperation with the Phelps Dodge Corporation
A Story of Arc Welding, 16mm. sound, No. x214
Made in cooperation with the Lincoln Electric Company
Tin from Bolivia, 16mm. sound, No. x215
Made in cooperation with Patino Mines and Enterprises Consolidated
The Story of Nickel, 16mm. sound, No. x217
Made in cooperation with the International Nickel Company, Inc.
How to Braze Aluminum, 16mm. sound, No. x219
Made in cooperation with Aluminum Company of America
How to Weld Aluminum — Torch Welding, 16mm. sound, No. x220
Made in cooperation with the Aluminum Company of America
How to Weld Aluminum — Arc Welding, 16mm. sound, No. x221
Made in cooperation with the Aluminum Company of America
How to Weld Aluminum — Resistance Welding, 16mm. sound, No. x222
Made in cooperation with the Aluminum Company of America
A Story of Lead, 16mm. sound, No. x228
Made in cooperation with St. Joseph Lead Company
Zinc — Its Mining, Milling and Smelting, 16mm. sound, No. x230
Made in cooperation with St. Joseph Lead Company
Tinplate, 16mm. sound, No. x231
Made in cooperation with Weirton Steel Company
This is Magnesium, 16mm. sound, No. x243
Made in cooperation with Dow Chemical Company
Melting and Refining of Stainless Steel, 16mm. sound, No. x240
Made in cooperation with Allegheny Ludlum Steel Corporation

United World Films, Inc.
1445 Park Avenue
New York 29, N. Y.
U. S. Government Films in the National Emergency, Machine Tools (a Bull.)

University of Kansas
Bureau of Visual Instruction
University Extension
Lawrence, Kans.
All 16mm. sound sf means Service Fee
Alloy Steels, sf 75¢
Aluminum — Blanking and Piercing, sf 75¢
Aluminum — General Sheet Metal Practice, sf 75¢
Aluminum — Spinning, sf 75¢
This is Aluminum, sf $1
Story of Arc Welding, sf $1
Art Metals, Care of, sf $1.25
Centering Small Stock, sf $1
Story of Copper, sf $1
Countersinking, counterboring and spot Facing, sf $1
Cutting an External Acme Thread, sf $1
Cutting an External National Fine Thread, sf $1
Cutting a Keyway on a Finished Shaft, sf $1
Cutting Keyways, sf $1
Cutting a Taper with the Compound Rest and with the Taper Attachment, sf $1
Cutting Thread with Taps and Dies, sf $1
Drilling, Boring and Reaming Work Held in Chuck, sf $1
Drilling a Whole in a Pin, sf $1
Drilling to Layout and Spot Facing a Cast Iron Valve Body, sf $1
Drilling and Tapping a Cast Steel Valve Body, sf $1
Facing, Turning, Boring, Grooving, Chamfering on a Vertical Turret Lathe Using Two Heads, sf $1.50
Fixed Gages, sf $1
Fundamentals of End Cutting Tools, sf $1
Fundamentals of Filing Hand Tools, sf $1
Laying out Small Castings, sf $1
Locating Holes, Drilling and Tapping in Cast Iron, sf $1
Machine Maker, sf $1.25
Machining a Tool Steel V Block, sf $1
Machining Rectangular Cast Iron Block, sf $1
Magnesium — Metal From the Sea, sf 75¢
Manufactured Abrasives, sf 75¢
Metalcraft, sf $1.25
Micrometer, sf $1.25
Nickel Refining, sf 75¢
Nickel, Story of, sf $1
Plain Indexing and Cutting a Spur Gear, sf $2
Rough Facing, Boring and Turning a Shoulder on a Vertical Turret Lathe, sf $1
Rough Facing, Turning and Drilling on the Vertical Turret Lathe, sf $1.50
Rough Turning Between Centers, sf $1
Scraping Flat Surfaces, sf $1
Stainless Steel, sf $1
Steel Goes to Sea, sf $1.25
Drama of Steel, sf $1
Steel Rule, sf $1.25
Story of Steel, sf $1.25
Vernier Scale, sf $1.50

Venard Organization, The
Peoria 2, Ill.
The Legacy, 16mm. sound, color, 27 min.
Two Tickets to Progress, 16mm. sound, color, 22 min.
The Ropp Farm Story, 16mm. sound, color, 17 min.
The Shadow of a Pioneer, 16mm. sound, 22 min.
A Trip Through a Modern Steel and Wire Mill, 16mm. sound, 24 min.

PLASTICS

Bakelite Division
Union Carbide and Carbon Corporation
300 Madison Avenue
New York 17, N. Y.
Selecting the Right Thermosetting Molding Material, 16mm. sound, 30 min.
Product Design and Molding Technique for Thermosetting Plastics, 16mm. sound, 42 min.

General Electric Company
Distribution Section
Advertising and Sales Promotion Division
Schenectady 5, N. Y.
(Requests should be sent to nearest General Electric Company Office — obtain address from above office.)
Kingdom of Plastics, 16mm. sound, color, 10 min., No. S-2602

University of Kansas
Bureau of Visual Instruction
University Extension
Lawrence, Kans.
All 16mm. films sound sf means Service Fee
Plastic Art, sf $1.25
Plastic Materials, Origin and Synthesis of, sf $1.25

PROFESSIONAL

Bray Studios, Inc., The
729 Seventh Avenue
New York 19, N. Y.
Bray Library of Motion Pictures, 16mm. silent and sound, catalog

Eastman Kodak Company
Rochester 4, N. Y.
Visual Aid Sources, Motion Pictures and Filmstrips

Encyclopaedia Britannica Films, Inc.
1150 Wilmette Avenue
Wilmette, Ill.
Encyclopaedia Britannica Films Bring the World to You (Film Catalog)

General Motors Corporation
Department of Public Relations — Film Section
General Motors Building
Detroit 2, Mich.
Requests from Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming address to:

General Motors Corporation
508 San Francisco Building
405 Montgomery Street
San Francisco, Calif.
Requests from Greater New York City and the communities of Long Island address to:
General Motors Corporation
Department of Public Relations
1775 Broadway
New York 19, N. Y.
The Easier Way, 16mm. sound, 13 min.
An American Miracle, 16mm. sound, 18 min.
Our American Crossroads, 16mm. sound, color, 26 min.
Strange Interview, 16mm. sound, 23 min.
A Professional Portrait, 16mm. sound, 23 min.
Experiment, 16mm. sound, 12 min.
The Price of Freedom, 16mm. sound, 23 min.
How *Not* to Conduct a Meeting, 16mm. sound, 10 min.
Selling America Today, 16mm. sound, 35 min.
Joe Learns a Thing or Two, 16mm. sound, 25 min.
Where Joe's Living Comes From, 16mm. sound, 25 min.
How Joe Gets His Living, 16mm. sound, 25 min.
Joe and His Government, 16mm. sound, 25 min.

Ideal Pictures
4000 Ross Avenue
Dallas, Tex.
Ideal Pictures, 1951 catalog

Keystone View Company
Meadville, Pa.
General Catalog
Title List on Furniture Units
Overhead Projector Circular

Mogull's
Camera and Film Exchange, Inc.
112 West 48th Street
Radio City
New York 19, N. Y.
General Catalog

National Association of Manufacturers
14 West 49th Street
New York 20, N. Y.
The Quarterback, 16mm. sound, 29 min.
Three to Be Served, 16mm. sound, 27 min.
American Anniversary, 16mm. sound, 15 min.

National Child Labor Committee
419 Fourth Avenue
New York 16, N. Y.
Migrant Farm Families — Koda-Slides and Tape Recording, 50 slides, color and black and white, rental charge
Child Labor at the Mid-Century, recording
Are These Your Children?, Film Strip and recording, 35mm. film and 78 RPM phonograph recording, 10 min.

Society for Visual Education, Inc.
Chicago, Ill.
SVE Educational Filmstrips, Slide-sets, and Slides Catalog

Swank Motion Pictures, Inc.
614 North Skinker Blvd.
St. Louis 5, Mo.
1952 Feature Film Catalog

Teaching Film Custodians, Inc.
25 West 43rd Street
New York 18, N. Y.
Films for Classroom Use, a booklet

Union Pacific Railroad
News Bureau
1416 Dodge Street
Omaha 2, Neb.
Nature's Art Gallery, 16mm. sound, color, 30 min.
Yellowstone National Park, 16mm. sound and color, 20 min.
Moon Over Sun Valley, 16mm. sound, color, 30 min.
Sun Valley Holiday, 16mm. sound, color, 20 min.
Spring Ski Chase, 16mm. sound, color, 15 min.
Sun Valley Time, 16mm. sound, color, 30 min.
Look, Listen, and Live, 16mm. sound, color, 25 min.

United States Office of Education
Superintendent of Documents
United States Government Printing Office
Washington 25, D. C.
Film Libraries:
Directory of 897 16mm. film libraries, Cat. No. FS 5.3:949/10, 15¢
Visual Education:
Movie Projectors in Public High Schools, Cat. No. FS 5.17:109, 15¢
102 Motion Pictures on Democracy, 16mm. sound selected and recommended by an Office of Education advisory committee, Cat. No. FS 5.3:950/1, 20¢

University of Kansas
Bureau of Visual Instruction
University Extension
Lawrence, Kans.
All 16mm. sound sf means Service Fee
American Teacher, sf $1.50
Facts About Films
Teaching, sf $1.25
Tips for Teachers, sf $2
You and Your Work, sf $1.25
Announcement of Audio-Visual Aids Motion Pictures

United World Films, Inc.
1445 Park Avenue
New York 29, N. Y.
1951 Catalogs of USDA Films (a bulletin)
How to Obtain U. S. Government Films (a bulletin)
Film Libraries Distributing U. S. Government Films (a bulletin)

Venard Organization, The
Peoria 2, Ill.
The People Together, 16mm. sound, color, 42 min.
Where the Road Turns Right, 16mm. sound, 38 min.
Hidden Treasures, 16mm. sound, 60 min.

Westinghouse Electric Corporation
School Service
306 Fourth Avenue
P.O. Box 1017
Pittsburgh 30, Pa.
On the Air, 16mm. and 35mm. sound, black and white, 22 min.
Prospects Set the Pace, 16mm. and 35mm. sound, black and white, 12 min.

TRANSPORTATION

Aetna Life Affiliated Companies
Public Education Department
1515 Farmington Avenue
Hartford 15, Conn.
Safe on Two Wheels, 16mm. sound, 10 min.
Champions at the Wheel, 16mm. sound, Kodachrome, 17 min.
Gentlemen of the Highway, 16mm. sound, black and white, 10 min.
Live — And Let Live, 16mm. sound, color, 10 min.

Association Films
35 West 45th Street
New York 19, N. Y.
Big Trains Rolling, 16mm. sound, color, 28 min.

Atchison, Topeka and Santa Fe Railroad System
Public Relations Department Film Bureau
80 East Jackson Blvd.
Chicago 4, Ill.
Chicago Railroad Fair, 16mm. sound, color, 10 min.
Diesel Locomotive — Its Maintenance and Operation, 16mm. sound, color, 32 min.
The Diesel Locomotive, 16mm. sound, 25 min.
Conquest, 35mm. slidefilm, 30 min., sound on record (33 1/3 rpm's). For use in Vocafilm or similar projector. A complete picture pamphlet with script available on request.
Loaded for War, 16mm. sound, 23 min.
Tank Destroyers, 16mm. sound, 23 min.
Wheels A'Rolling, 16mm. sound, 28 min.
Along the Santa Fe Trail, 16mm. sound, color, 26 min.
Arizona Winter Ranches, 16mm. sound, color, 10 min. (also silent version)
At Your Service, 16mm. sound, color, 25 min.
Carlsbad Caverns, 16mm. sound, color, 10 min. (also silent version)
Citrus, 16mm. sound, color, 14 min.
El Navajo, 16mm. sound, color, 43 min.
Grand Canyon, 16mm. sound, color, 17 min. (also silent version)
Let's See Chicago, 16mm. sound, color, 22 min.
Museum and Sante Fe Railroad, 16mm. sound, color, 10 min. (also silent version) — 800 ft. reel
Navajoland, 16mm. sound, color, 10 min.
Navajo Sandpainters, 16mm. sound, color, 22 min.
San Diego Zoo, 16mm. sound, color, 10 min.
Southern California, 16mm. sound, color, 16 min. (also silent 2 reel)
Southwestern Indian Dances, 16mm. sound, color, 10 min.
Summertime in Yosemite, 16mm. sound, color, 10 min. (also silent version)
Winter in the Desert, 16mm. sound, color (also silent version)
The Operation of a Steam Locomotive, 16mm. silent, black and white, 15 min.

B & O Railroad
Railroad Safety
B & O Building
Room 1000
Baltimore 1, Md.
The Happy Locomotive, color slide film cartoon

Bicycle Institute of America, Inc.
122 East 42nd Street
New York 17, N. Y.
Bicycling Safely Today, 16mm. sound, 20 min.
On Two Wheels, 16mm. sound
Bicycling with Complete Safety, 16mm. sound

Canadian Pacific Railway
Department of Public Relations
Windsor Station
Montreal, Quebec
Across Canada, 16mm. sound, color, 30 min.
Shining Mountains, 16mm. sound, color, 19 min.
Banff's Gold Challenge, 16mm. sound, color, 21 min.
Jack Pine Journey, 16mm. sound, color, 20 min.
West Coast Playground, 16mm. sound, color, 12 min.
Klondike Holiday, 16mm. sound, color, 22 min.
The Outside Run, 16mm. sound, color, 12 min.
Canada's Tackle Busters, 16mm. sound, color, 21 min.
Down by the Sea, 16mm. sound, color, 11 min.
Summer in Old Quebec, 16mm. sound, color, 12 min.
Land of Ski Hawks, 16mm. sound, color, 11 min.
Skyline Skiing, 16mm. sound, color, 11 min.
Cruising Inland Seas, 16mm. sound, color, 11 min.
Canadian Mountain Summer, 16mm. sound, color, 11 min.
Alaska and the Yukon, 16mm. sound, color, 11 min.
The Radiant Rockies, 16 mm. sound, color, 22 min.
Riding High, 16mm. sound, color, 10 min.
Winter Playground, 16mm. sound, color, 10 min.
Skiing in the Laurentians, 16mm. sound, color, 11 min.
Happy Voyage, 16mm. sound, color, 17 min.
Canadian Pacific in the Air, 16mm. sound, color, 22 min.
Skiing Mountains, 16mm. silent, color, 30 min.
Canada's Tackle Busters, 16mm. silent, color, 33 min.
Down by the Sea, 16mm. silent, color, 19 min.
Hiking on Top of the World, 16mm. silent, color, 17 min.
Trail Riding through the Clouds, 16mm. silent, color, 29 min.
The Maritimes, 16mm. silent, color, 16 min.
Summer Idyll, 16mm. silent, color, 13 min.
Snow Hills of Quebec, 16mm. silent, color, 16 min.
Sunshine Skiing, 16mm. silent, color, 15 min.

Case Company, J. I.
Racine, Wis.
You Be the Judge, 16mm. sound, color, 20 min.
Modern Farm Machines Bring Back the Range, 16mm. sound, color, 20 min.
Stripes and Curves, 16mm. sound, color, 22 min.
Pageant of Progress, 16mm. sound, color, 22 min.
Hydraulic Controls, 16mm. sound, color, 15 min.
The Saga of Sawdust Sam, the Almost Careful Hired Man, 35mm. slidefilm, 12 min.
Starting New Tractors, 35mm. slide film, with manual

Central Railroad of New Jersey
Attention: Director of Information
Jersey City Terminal
Jersey City 2, N. J.
The BIG Little Railroad, 1 reel, sound, color, 25 min.

Chicago, Milwaukee, St. Paul and Pacific Railroad
516 West Jackson Boulevard
Chicago 6, Ill.
Railroad at Work, 16mm. sound, 30 min.

Chicago, Rock Island, Pacific Railroad Company
Office of Public Relations
LaSalle Street Station
Chicago, Ill.
Wheels of Progress, 16mm.

Clark Equipment Company
Advertising Department
Industrial Truck Division
Battle Creek, Mich.
Modern Materials Handling Methods, 16mm. sound, black and white, 17 min.

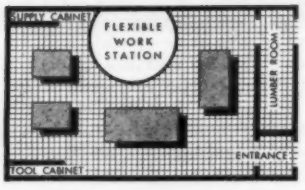
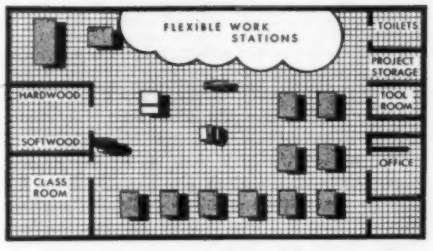
Denver and Rio Grande Western Railroad
605 Rio Grande Building
1531 Stout Street
Denver 1, Colo.
California Zephyr, 16mm. sound, color, 30 min.

Duluth, Missabe and Iron Range Railway
Wolvin Building
Duluth 2, Minn.
Spirit of Safety, 16mm. and 35mm. sound, 27 min.

Ethyl Corporation
100 Park Avenue
New York 17, N. Y.
The Long Road, 16mm. sound, black and white, 20 min.

General Electric Company
Distribution Section
Advertising and Sales Promotion Division
Schenectady 5, N. Y.
(Requests should be sent to nearest General Electric Company Office — obtain address from above office.)
Jet Propulsion, 16mm. sound, color, 15 min., No. AS-2589

(Continued on page 24A)

No school's too small  ...or too large  ...for Shopsmith

It's easy enough to see where multi-purpose SHOPSMITH fits into the shop program of smaller schools. One SHOPSMITH takes the place of five individual tools — circular saw, disc sander, wood lathe, vertical and horizontal drill press. It saves space. And it means a better equipped shop on a lower budget.

But what place has SHOPSMITH in large, well-equipped school shops?

You find the answer in SHOPSMITH's *flexibility*. A shop that has several SHOPSMITHS is a *Flexible Shop*. It can be changed to meet the needs of any group of students, any projects, any teaching techniques. In the *Flexible Shop*, machines and students need never stand idle, since the SHOPSMITHS can be converted to relieve congestion or tie-ups. The shop operates at 100% efficiency. Students learn faster. Instruction becomes more effective.

Basic SHOPSMITH costs $189.50 without motor, $232.45 with ½-hp. motor and special school guards. It has been tested and approved by prominent industrial arts educators. Write for specifications of SHOPSMITH and information about the *Flexible Shop*.

Magna Engineering Corporation

SHOPSMITH

MAGNA ENGINEERING CORPORATION

Dept. 230-U, *at factory nearest you*
12819 Coit Road, Cleveland 8, Ohio, OR
Menlo Park, California

Please send me complete information about the *Flexible Shop* and the application of SHOPSMITH to industrial arts education.

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School _____

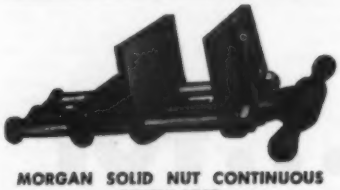
Address _____

City _____ State _____

Start the School Year Right With

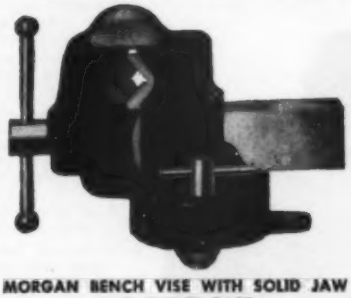
MORGAN VISES

for WOODWORKING



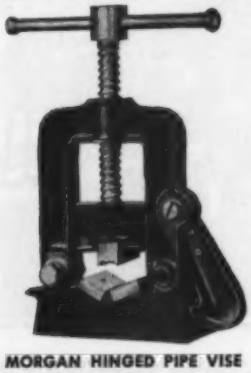
MORGAN SOLID NUT CONTINUOUS SCREW VISE

for MACHINE SHOP



MORGAN BENCH VISE WITH SOLID JAW AND SWIVEL BASE

for PIPE WORK



MORGAN HINGED PIPE VISE

GUARANTEE

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MORGAN VISE CO.

120 N. Jefferson Street
Chicago 6, Illinois

ASSOCIATION NEWS

(Continued from page 8A)

eral welfare of the schools, teachers, and students should claim the attention of all.

Paul S. Weaver, president, Lake Erie College, Painsville, Ohio, pointed out that (1) 3 to 5 million of our people are alcoholics, (2) we use 6,600,000 sleeping potions every day, and (3) we have about 9 million neurotics in the United States. All of this points to the fact that a great many of our people find that life is not as effective as they would like.

Science has advanced very rapidly. We have advanced technologically, we are learning more about atomic energy, all of which confronts the world with unexpected emergencies which need fundamental solutions.

To overcome worry and unhappiness we must turn to something that we can do, love, hope for. We must go back to the teaching of Christ. We must again face life with hope, for when man no longer has hope, then he is dead.

The annual banquet was held on Friday evening. The main address was given by Max K. Gilstrap, chief, Central News Bureau, *Christian Science Monitor*, who spoke on the subject "Your World and You."

The annual business session was held on Saturday morning.

The "Skiff Program" followed immediately with Milford W. Hamlin, American Type Founders, Inc., Chicago, acting as captain of the Skiff.

Roy R. Van Duzee, director of the West Allis School of Vocational and Adult Education, was elected president of the Wisconsin Association of Directors of Vocational and Adult Education for 1952–53.

Gustav Hirsch, director of the Cudahy School of Vocational and Adult Education, was chosen as secretary-treasurer of the above organization.

There were approximately 670 registrants, and 33 exhibitors.

EPSILON PI TAU HOLDS THIRD ANNUAL INITIATION

Alpha Kappa Chapter of Epsilon Pi Tau, the international honor society in industrial education, held its third annual initiation banquet recently in the Hotel Harris. The speaker for the day was Dr. John Fuzak of Michigan State College, who spoke on the topic "Opportunities Unlimited." Dr. Zack York acted as toastmaster.

Twenty new initiates composed of students, faculty members, and alumni, who are in the field of industrial education, were taken into the fraternity. They are: Richard Bentley, Albion; Vaugh Best, South Bend, Ind.; William Braun, WMC; Duane R. Brooks, WMC; Harry Brown, WMC; James R. Dissette, WMC; Herbert Ellinger, WMC; John Fuzak, Michigan State; George F. Henck, WMC; Roger A. Hummel, WMC; Robert M. Johnson, WMC; Bernard J. Kennedy, Grand Rapids; George E. Kohrman, WMC; Fred J. Konrath, WMC; Bernard R. Leech, WMC; Andrew Luff, WMC; Donald J. McDowell, WMC; John H. Plough, WMC; Norman Russell, WMC; Neil L. Schoenhals, WMC; Robert D. Seuss, WMC; Sylvester Szymczak, WMC; William G. Yena, WMC. The engraved keys given each new member will be presented at the Michigan I.E.S. Convention.

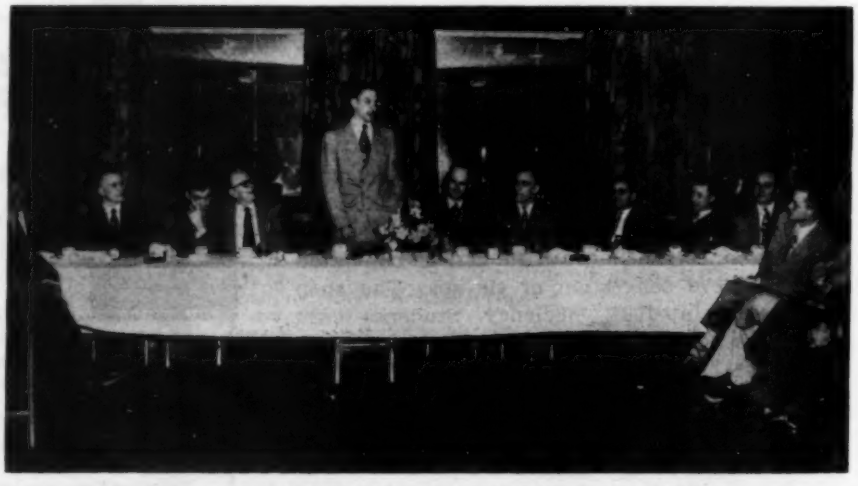
Vice-president Richard Steele was general chairman of the event and Theo Zimmerman was in charge of the initiating team. Fifty-seven members from Southwestern Michigan were present for the banquet. — *Wallace F. Fillingham.*

OHIO INDUSTRIAL ARTS ASSOCIATION MEETING

On Friday, April 18, the members of the Northeastern Ohio Industrial Arts Association were guests at the Goodyear Tire and Rubber Company in Akron for their annual spring meeting.

After a short business meeting the group was entertained at a splendid meal furnished

(Continued on page 24A)



Speakers' table at Initiation Banquet of Alpha Kappa Chapter, Epsilon Pi Tau, 1952

Left to right: Richard McIlvride, secretary; Richard Steele, vice-president; Wallace Fillingham, president; Dr. Zack York, Western Michigan College, toastmaster; Dr. John Fuzak, Michigan State College, speaker; George Kohrman, head, industrial education, Western Michigan College; Bernard Kennedy, supervisor, industrial arts, Grand Rapids; Dr. John L. Feirer, head, industrial-arts department, Western Michigan College; Dr. Joseph Giachino, head, vocational education, Western Michigan College; Lawrance Brink, faculty trustee, Western Michigan College

HOW LONG SHOULD JOINTER TABLES and FENCES BE?

In jointer design there is a definite relationship between fence length and table length. It is generally conceded that a jointer is as good as it is long. Lengthening of a table alone is not sufficient to increase the scope of use of a jointer. The fence, likewise, must be extended and should always be as long as the infeed table plus 60% of the length of the outfeed table and ABSOLUTELY RIGID ALONG ITS ENTIRE LENGTH. To assure accuracy and avoid work spoilage, tables and fences furthermore must be absolutely flat and straight, AND STAY THAT WAY regardless of abnormal operating conditions.

BOICE-CRANE JOINTERS

have the longest fences of any 6" or 8" jointers, the longest tables of any 8" jointers, and afford the BIGGEST values in any 6" and 8" jointers. They are rugged and accurate.

All Boice-Crane jointer head bearings stand speeds up to 5500 r.p.m. Tables are simultaneously ground flat and parallel to closest limits — stay flat. Boice-Crane offers the only long-table jointers with full-length, front-adjusting, double-locked fences. When rabbeting, the exclusive guard on all Boice-Crane jointers stays on the machine — simply turn and swing out of the way.

NEW, WELDED, ALL-STEEL LONG-TABLE MODELS

Permit strength, permanent accuracy and alignment impossible with bolted-up cast iron construction. Using steel (3 times stronger than cast iron of same thickness), tables are extended without increasing width, thickness, weight or floor space. A comparable cast iron jointer would weigh more than twice as much. Tables undergirded full length. There are no springy overhanging tables to spoil heavy work. Steel is actually 2 to 3 times stiffer than iron. The entire infeed table is a rabbet arm. These are the first jointers with adequate support for narrow rabbeting on wide stock. Quick, positive, micrometer-accurate knife setting. All knives cut the exact same depth within .002" to .003" — setting a new standard for perfect work without chatter marks . . . better finish . . . smoother operation. 3¼-inch diameter head (3⅛-inch cutting circle), 20% larger than conventional 6-inch jointers. Improved cutting angle. Depth of cut control, table locks, direct reading depth scale and switch easily used in a comfortable, normal operating position. New rotor-on-cutterhead or V-belt drive is optional.

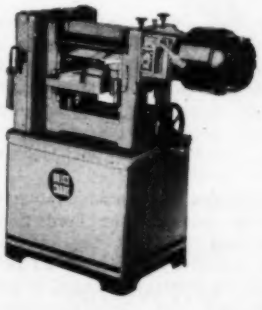
THE BOICE-CRANE NO. 1400 LOW-PRICED 6" JOINTER

Has cast iron table and base. Loaded with features not found on others in its price range. Its 36" tables are up to 6" longer than others; the fence extends practically full-length of the tables (35" long) and has exclusive front and rear lock rigidity. The larger 2¾" diameter cutterhead affords a freer cutting "rake-angle" to knives, for a chatterless and much smoother shearing cut rather than the chipping and chattering cut common to smaller diameter cutterheads.

Boice-Crane offers a complete line of job-rated jointers —

Model No.	*Size*	*Without auxiliary feeding aids, recommended for stock lengths to*	*Length being a factor, recommended for stock sizes to*	*Planes boards and panels to*	*Fence*	*Depth of cut*	*Cutterhead diameter*	*Cutting arc diameter*
3400	8" x 84"	8 ft.	8" x 8"	16" wide	66" x 4"	⅝"	3¼"	3⅜"
2400	6" x 60"	6 ft.	6" x 6"	12" wide	48" x 4"	⅜"	3¼"	3⅜"
1400	6" x 36"	4 ft.	4" x 6"	12" wide	33" x 3⅜"	⅜"	2¾"	3"

A HEAVY-DUTY PLANER OF PRACTICAL CAPACITY AT A SENSIBLE PRICE!



THE BOICE-CRANE 12" x 4" THICKNESS PLANER

Includes every feature, but costs a hundred dollars less than planers only slightly wider. All the capacity average shops use, at a saving of 30% under the next larger size. Handles jobs impossible with larger outsize planers. Without butt-feeding, it planes pieces down to 6½" long and hard wood down to as thin as 1/16", smooth as silk and to a thousandth of an inch precision, without tearing. Saves big money by salvaging short and thin scrap.

OVER 50% FASTER THAN SIMILAR UNITS

Powered for output of 14 feet per minute. Has a massive, one-piece main frame and the extra weight bolted-up frames lack for long, accurate service. Thousands of installations date back 15 or more years. Machine Serial No. 1 still operates daily, having planed millions of feet of hard wood.

STEADY, POWERFUL, GROOVED STEEL INFEED ROLL! FINER FEED MECHANISM ELIMINATES COSTLY MAINTENANCE!

No troublesome clutches or double-worm reduction gear overly vulnerable to intermittent strains and shocks in feeding stock. Simplified, quieter feed gear fully cushioned against jamb-ups on feeding that cause others to fail. Instant feed control without stopping motor. Power driven rolls in bronze-bushed self-aligning journals automatically adjust when work thickness varies — an exclusive feature.

SIMPLE, EASY BLADE SETTING

12¼" x 20" table. Thick walls and exceptionally well ribbed table casting stays flat and true. Two table idler rolls — often omitted in inferior machines.

SAFER, SMOOTHER OPERATION

Less power required. Choice of 1½ and 2 h.p. direct to cutterhead or V-belt motor, engine or lineshaft drive. Bench or complete floor type units.

BOICE-CRANE COMPANY
932 Central Avenue
Toledo 6, Ohio

Please send free literature on
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School.....
Street.....
City & State.....

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through industrial supply distributors in most cities. No long waits for delivery. High quality, low cost tools for cutting, shaping, drilling finishing wood, fibre, metals and plastics.

TEACHING MATERIALS

(Continued from page 250)

General Motors Corporation
Department of Public Relations— Film Section
General Motors Building
Detroit 2, Mich.

Requests from Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming address to:
General Motors Corporation
508 San Francisco Building
405 Montgomery Street
San Francisco 4, Calif.

Requests from Greater New York City and the communities of Long Island address to:
General Motors Corporation
Department of Public Relations
1775 Broadway
New York 19, N. Y.

Safe as You Think, 16mm. sound, 28 min.
We Drivers, 16mm. sound, color, 13 min.
Safety Patrol, 16mm. sound, 10 min.
Man on Horseback, 16mm. sound, 10 min.
On Two Wheels, 16mm. sound, 14 min.
The ABC of Internal Combustion, 16mm. sound, color, 13 min.
The ABC of the Automobile Engine, 16mm. sound, color, 18 min.
ABC of the Diesel Engine, 16mm. sound, color, 20 min.
Diesel — The Modern Power, 16mm. sound, 21 min.
Harnessed Lighting, 16mm. sound, color, 25 min.
Where Mileage Begins, 16mm. sound, 19 min.
Basic Principles of Lubrication, 16mm. sound, 25 min.
The ABC of Hand Tools, 16mm. sound, color, Part I, 18 min., Part II, 15 min.
Styling the Motor Car, 16mm. sound, color, 20 min.
The Questing Mind, 16mm. sound, color, 20 min.
Caught Mapping, 16mm. sound, 9 min.
Working on Air, 16mm. sound, 10 min.
Lest We Forget, 16mm. sound, 10 min.
To New Horizons, 16mm. sound, motion, color, 24 min.
Horizons Unlimited, 16mm. sound, 17 min.
General Motors Institute, 16mm. sound, 27 min.
A Professional Portrait, 16mm. sound, 23 min.
Safety Our No. 1 Crop, 16mm. sound, 22 min.

General Motors Corporation
Flint, Mich.

Driver Education Series — 15 films (3 16mm. motion, 12 slides)

General Petroleum Corporation
Sales Promotion Department
612 South Flower Street
Los Angeles 54, Calif.

That They May Live, 16mm. sound, black and white, 12 min.

Goodyear Tire and Rubber Company, Inc.
Motion Picture Department
Akron, Ohio

Airships, 16mm. sound, 10 min., 400 ft.

(Continued on page 27A)

Snap-on*
TORQOMETERS
HELP YOU TEACH THE IMPORTANCE OF PRECISION TENSIONING...

TORQOMETERS are tools of major importance in shop instruction. Where bolt pressures are specified (as on so many parts assemblies of engines and other precision machinery), Torqometers *should always be used* in maintenance and repair. Repeatedly it has been proved that, with standard wrenches, mechanics of the highest skill cannot even approximate specified pressures. The result is uneven tension—and mechanical distortion—friction losses—rapid wear—failure of critical parts.

Using a Torqometer is an enlightening experience for the student. On the big, easy-to-read dial he *sees* the accuracy of his work—sees the needle strike the exact inch-or-foot-pound. He quickly learns that with a "Torq," he does the job *exactly right* . . . with greater speed and ease than sloppy guesswork tightening.

For information on Torqometers and the complete Snap-on line of more than 4000 mechanics' hand and bench tools, write for the free Snap-on Catalog.

SNAP-ON TOOLS CORPORATION
8074-1 28th Ave., Kenosha, Wisconsin

*Snap-on is the trademark of Snap-on Tools Corporation

ASSOCIATION NEWS

(Continued from page 22A)

by the firm. A trip through the tire plant and an explanation of their training program was another interesting feature of the meeting. The plant tour consisted of a complete survey of the manufacture of a tire, starting with crude rubber to the finished product.

The annual election was held and the business session with the following men being elected: M. J. LERNER, Ashland, Ohio, president; ELLIS T. MILLS, Cuyahoga Falls, Ohio, vice-president; HOWARD SHADLE, Mentor, Ohio, secretary; WILLARD C. BARNES, Mentor, Ohio, treasurer; GERALD BABSON, Willoughby, Ohio, representative of city schools; STANLEY ZYLOWSKI, Cleveland, Ohio, representative of county schools; PETER GULGIN, Youngstown, Ohio, representative of exempt villages; and MARTIN JOHNSON, Kent, Ohio, delegate at large.

LOUISIANA'S INDUSTRIAL EDUCATION AWARDS CONTEST

The Second Annual Industrial Education Contest was held at Northwestern State College, Natchitoches, La., on April 26. Seventy-two contestants from 14 industrial-arts centers and two vocational schools entered the contest. This number represented nearly double the entries of last year.

The contest was divided into four groups patterned largely after the Ford Industrial Arts Awards Contest. Winners from each group were awarded certificates indicating their classification, project, and rating. First- and second-place winners in groups three and four were given a scholarship to Northwestern State College in addition to their certificates.

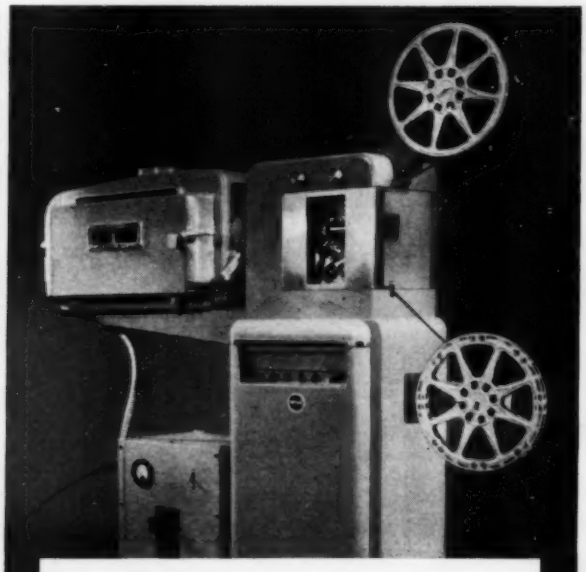
All projects winning a "Superior" rating were recommended for entry in the Ford Contest. Three judges used the following criteria in evaluating the projects: (1) design, 20 points; (2) construction, 45 points; (3) finish, 35 points.

A test was given each contestant over the area in which a project was entered. The combined test and project score was used to determine each student's rating. The method of rating was: 70–79, good; 80–89, excellent; 90–100, superior.

Plans are underway for the 1953 contest which will be held at Northwestern State College on April 17–18, in connection with Louisiana's Seventh Annual Industrial Education Conference.

KODASCOPE PAGEANT SOUND PROJECTOR

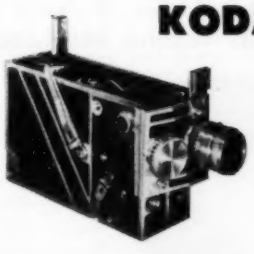
Shows 16mm. movies with new brilliance, new clarity . . . sharp from corner to corner. Unique—*focusing*—audio system provides clear, authentic tones at all volume levels. The entire projector is *permanently lubricated.* An 8-inch speaker, ample for all average conditions, is cased with the projector . . . the accessory Kodak Multi-Speaker Unit can be obtained to expand the Pageant into a two-case, four-speaker outfit, capable of coping with virtually any acoustical condition. The single-speaker Pageant is $400 . . . *with* the Multi-Speaker Unit, only $492.50.



EASTMAN 16mm. PROJECTOR, MODEL 25

Built for heavy-duty service in auditoriums, theatres, assembly halls. Unique geneva movement advances film surely, smoothly. Separate motors drive geneva movement, main projector mechanism, blower, and reel arms, eliminating all shock forces. Powerful optical system, completely Lumenized, assures sparkling screen images. High-fidelity sound amplifier equipment gives amazingly faithful reproduction. Two models—high-intensity arc (shown) and tungsten. Prices from $3,485.

IT PAYS TO USE KODAK Audio-Visual EQUIPMENT



CINE-KODAK SPECIAL II CAMERA

The world's most versatile 16mm. motion-picture maker, yet almost as simple to use as the average personal movie camera. The ideal camera with which to make your own top-quality films for teaching, demonstrating, lecturing, and research—with such professional effects as fades, dissolves, multiple exposures, and animations. Prices from $956.20, inc. Fed. Tax.

KODASLIDE TABLE VIEWER, Model A

Add new life and zest to small study groups by showing your 2" by 2" color transparencies on this brilliant screen. In one handy case—a built-in projector, screen, and slide changer, that you can move from room to room, set it up in a moment. And there's no need to dim lights or pull curtains! Price, $97.50.

KODASLIDE PROJECTOR, Master Model

Gives your color transparencies dramatic realism for large-group showings in classrooms, church halls, and auditoriums. Sharply detailed screen images are projected with such unparalleled brilliancy that ample light may be left on for note taking! Cool and quiet in operation. Available with a choice of four fast lenses, including two sharp-cutting Ektar f/2.3 Lenses, and lamps up to 1000 watts. Prices from $169.

Prices subject to change without notice.

193

EASTMAN KODAK COMPANY, Rochester 4, N. Y.

Please send me information on the products checked: ☐ ***The Kodascope Pageant Sound Projector;*** ☐ ***Model 25;*** ☐ ***Cine Special II;*** ☐ ***Table Viewer;*** ☐ ***Kodaslide Projector.***

NAME_____ POSITION_____

COMPANY_____

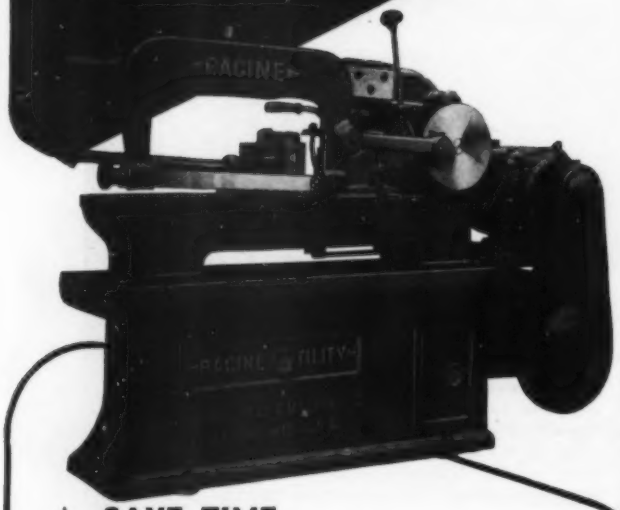
ADDRESS_____

CITY_____ ZONE_____

STATE_____

Kodak

RACINE "Utility" METAL CUTTING MACHINES



★ SAVE TIME
★ EASY TO OPERATE
★ FAST AND ACCURATE
★ FULLY HYDRAULIC

The ideal general purpose saw for cutting any metal from screw stock to tool steels up to 6″ x 6″ size.

The "Utility" is used in large and small industries, schools and institutions for general and special metal cutting work.

These saws are hydraulically operated for smooth oil-cushioned metal cutting. Completely guarded — no exposed gears or belts. Require a minimum of floor space. Models are available in Wet or Dry Cut styles.

Write us about your metal sawing problems — no obligation. Address Racine Hydraulics & Machinery, Inc., 2080 Albert St., Racine, Wisc.

Investigate our complete line of Oil Hydraulic Pumps, Valves, and Systems. Ask for Catalog P-10-D.

BUY DEFENSE BONDS

RACINE

STANDARD FOR QUALITY AND PRECISION

RACINE TOOL and MACHINE CO.

RACINE

STANDARD FOR QUALITY AND PRECISION

"YANKEE" Spiral Drivers & Push Drills TEACH MOTION-SAVING

Help students do better work with fewer motions. Just a simple push with a "Yankee" Spiral Screw Driver spins the blade and drives the screw. No heavy wrist work! A flick of the shifter gives driving or drawing action, or sets spiral rigid. Pilot holes made easily with a "Yankee" Automatic Push Drill. Spring brings back handle after every push; reverse-spins drill point to clear out chips. Magazine handle holds 8 points, 1/16″ to 11/64″. Write for free "Yankee" Tool Book.

No. 130A Spiral Driver

No. 41 Push Drill

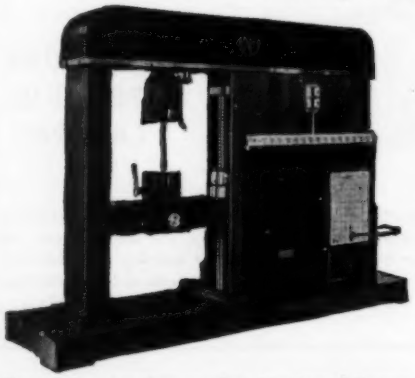
NORTH BROS. MFG. CO.
Philadelphia 33, Pa.

STANLEY

Ideal for Classroom Instruction

NATIONAL FORGE

Universal Testing Machine



Model TMU — Only 44 in. High, 15,000-lb. or 30,000-lb. Capacity

Ease of operation makes National Forge Universal Testing Machines ideal for school instruction tests of a great variety of materials and specimen sizes. Compact, rugged, dependable. A.S.T.M. accuracy. Three scale ranges on each machine give widespread utility. Controls are simplified, with safety cutouts. Infinitely-variable speed. Moderate in price.

WRITE FOR BROCHURE 501

Testing Machine Division

NATIONAL FORGE AND ORDNANCE COMPANY

Dept. IA, Irvine, Warren County, Pennsylvania

TEACHING MATERIALS

(Continued from page 24A)

American Success Story, 16mm. sound, 20 min., 800 ft.
Arizona Story, 16mm. sound, four reeler (1600 feet), 45 min.
Balloons, 16mm. sound, one-reel, 10 min.
Camp Manatoc, one-reel, 16mm. sound, 10 min.
Conquering the Jungle, one-reel, 16mm. sound, 10 min.
Golden Valley, two-reel (800 ft.), 16mm. sound, 20 min.
Jack Pines Run, one-reel, 16mm. sound, 10 min.
Modern Coal Mining, two-reel (800 ft.), 16mm. sound, 20 min.
Mules to Motors, one-reel, 16mm. sound, 10 min.
From Nine to Noon, two-reel, 16mm. sound, 20 min.
When Industry Plays, one-reel, 16mm. sound, 10 min.
Rolling Wheels, one-reel, 16mm. sound, 10 min.
Step On It, two-reel (800 ft.), 16mm. sound, 20 min.
A Big Race for Little Wings, two-reel (800 ft.), 16mm. sound, 20 min.
The Air Fleet, one-reel, 16mm. silent, 12 min.
Arizona, one-reel, 16mm. silent, 12 min.
Balloon Racing, one-reel, 16mm. silent, 12 min.
Conquering the Jungle, one-reel, 16mm. silent, 12 min.
Island of Yesterday, one-reel, 16mm. silent, 12 min.
Modern Coal Mining, two-reel, 16mm. silent, 12 min.
Parade of Comic Balloons, one-reel, 16mm. silent, 12 min.
Story of the Airship, one-reel, 16mm. silent, 12 min.
Trails of Camp Manatoc, two-reel, 16mm. silent, 25 min.

Hercules Powder Company
Wilmington, Del.
Better Roads Ahead, 16mm. sound, color, 10 min.

Modern Talking Picture Service, Inc.
142 East Ontario Street
Chicago, Ill.
Colorado-Vacationland Supreme, 16mm. film.

National Automobile Theft Bureau
175 West Jackson Blvd.
Chicago 4, Ill.
Automobile Fires, 16mm. sound, color, 34 min.

National Military Establishment
Public Information
Pictorial Branch
Washington 25, D. C.
(Prints should be ordered from your nearest Naval District.)
Sea Power for Peace, MN 6704, 16mm. sound, black and white, 9 min.
Naval Photography in Science, NM 5348C, 16mm. sound, 28 min.
Naval Photography in Intelligence, MN 5348D, 16mm. sound, 17 min.
U. S. Naval Academy, MN 5318, 16mm. sound, 39 min.

(Continued on next page)

New Publications

Machine-Shop Technology

By C. A. Felker. Cloth, 489 pp., 6⅛ by 9 in., illus., $4.80. The Bruce Publishing Co., Milwaukee 1, Wis.

A text on the related material that ought to accompany the practical work in courses on machine-shop practice. It is, therefore, useful in technical high schools, general high schools where shopwork is taught, and part-time and full-time vocational schools.

The material covered describes the skills needed to operate the power saw, drill press, lathe, shaper, planer, milling machine, gear cutters, and grinding machine. Hand-tool operations also are explained.

The information given in the text is arranged so that it is given when needed, using a given skill in performing a certain operation.

Trade science, trade mathematics, and the like, also is emphasized specially when it is to be applied on a given job.

At the end of each unit a list of questions for discussion have been appended. The use of the tables in handbooks commonly used by mechanics in industry, is encouraged, and the text itself presents useful tables that will be found exceedingly helpful.

School Experiments With Alternating Current

By W. E. Pearce. Cloth, 153 pp., 5 by 7½ in., illus., $2.75. Chas. A. Bennett Co., Inc., Peoria, Ill.

A textbook which presents this intricate phase of electricity in language simple enough for the understanding of the students.

Throughout the book the student is shown how to make simple pieces of equipment which will help him to make many experiments that demonstrate the laws of a.c. electricity, and assist him to understand the subject with greater ease.

Woodwork for the Beginner

By Franklin H. Gottshall. Cloth, 139 pp., 7⅞ by 11⅛ in., illus., $4. The Bruce Publishing Co., Milwaukee 1, Wis.

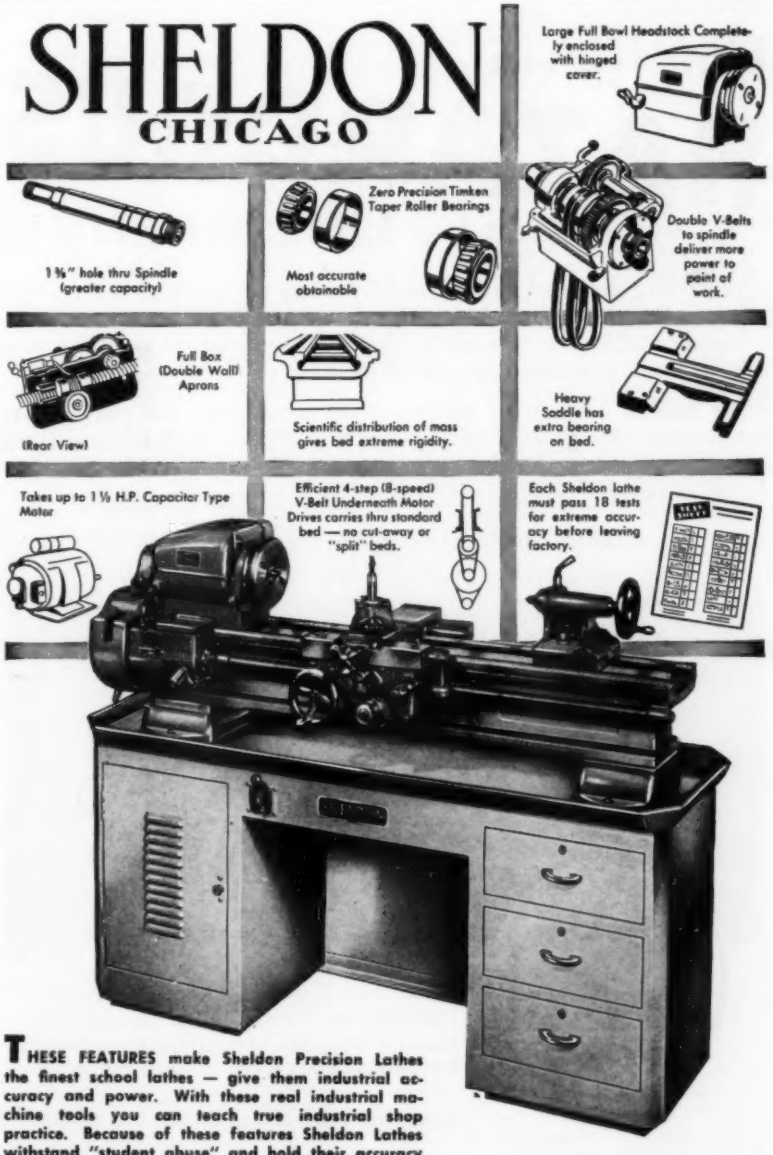
The author of this book is well known as a teacher and a writer on the subjects of woodwork and design.

His present book offers 30 well-designed projects that are easy to make, pleasing, and useful.

The subject of giving them the right kind of finish is also taken care of in the author's usual clear style.

(Continued on next page)

SHELDON
CHICAGO


Large Full Bowl Headstock Completely enclosed with hinged cover.
1⅝" hole thru Spindle (greater capacity)
Zero Precision Timken Taper Roller Bearings
Most accurate obtainable
Double V-Belts to spindle deliver more power to point of work.
Full Box (Double Wall) Aprons
(Rear View)
Scientific distribution of mass gives bed extreme rigidity.
Heavy Saddle has extra bearing on bed.
Takes up to 1½ H.P. Capacitor Type Motor
Efficient 4-step (8-speed) V-Belt Underneath Motor Drives carries thru standard bed — no cut-away or "split" beds.
Each Sheldon lathe must pass 18 tests for extreme accuracy before leaving factory.

THESE FEATURES make Sheldon Precision Lathes the finest school lathes — give them industrial accuracy and power. With these real industrial machine tools you can teach true industrial shop practice. Because of these features Sheldon Lathes withstand "student abuse" and hold their accuracy without constant bearing maintenance. With fully enclosed headstocks and available with lever-operated speed-changes. They are safe for students to operate.

WRITE FOR CATALOG

SHELDON MACHINE CO., Inc. 4244 N. Knox Avenue CHICAGO 41, U. S. A.

TEACHING MATERIALS

(Continued from previous page)

Antarctic Expedition, MA-2431, 16mm. sound, 18 min.
The Zipper Fleet, MN 6647, 16mm. sound, 10 min.
They Came to an Island, MN 5834, 16mm. sound, 35 min.
Silent Service, MN 9141, 16mm. sound, 38 min.
Operation Crossroads, MN 5354 16mm. sound, 27 min.
Atomic Bomb Test — Bikini Island, MN 5352, 16mm. sound, 18 min.
One Man Task Force, MN 5355, 16mm. sound, black and white, 38 min.
History of Lighter Than Air Rigid Airships, MN 2722d, 16mm. sound, black and white, 40 min.
The Fleet That Came to Stay, MN 5802, 16mm. sound, 20 min.
Prelude to Victory, MN 9119d, 16mm. sound, 40 min.
Sea Power in the Pacific, MN 6124, sound, black and white, 30 min.
Fury in the Pacific, MN 9045, 16mm. sound, black and white, 20 min.
To The Shores of Iwo Jima, MN 5124, 16mm. sound, color, 20 min.
Brought to Action, MN 5297, 16mm. black and white, 20 min.
Of Liberal Education, MN 6605, 16mm. sound, 20 min.

New York, New Haven and Hartford Railroad Company
Public Relations Department
Room 490, South Station
Boston 10, Mass.
It's Fun to Travel by Train, filmstrip, 88 frames

Norfolk and Western Railway
Advertising Department
501 General Office Building
Roanoke, Va.
The Power Behind the Nation, 16mm. sound, color, 38 min.
Operation Fast Freight, 16mm. sound, color, 25 min.
Modern Coal-Burning Steam Locomotive, 16mm. sound, color, 25 min.

Pennsylvania Railroad
Broad Street Station Building
1617 Pennsylvania Blvd.
Philadelphia 4, Pa.
Clear Track Ahead, 16mm. sound, 25 min.

Socony-Vacuum Oil Company
26 Broadway
New York 4, N. Y.
Ceiling Unlimited, 16mm. sound, black and white, 28 min.
The Big Climb, 16mm. sound, color, 15 min.

Shell Oil Company
50 West 50th Street
New York 20, N. Y.
or
100 Bush Street
San Francisco 6, Calif.
Flight Log, 16mm. sound, black and white, 20 min.
How an Airplane Flies, 16mm. sound, black and white
Screw Drivers and Screw Jays, 16mm. sound, black and white, 14 min.

Standard Oil Company
Chicago, Ill.
Farm Tractor Care, 16mm. sound, color, 31 min.
Lubricating Oil's Amazing Molecules, 16mm. sound, color, 22 min.

(Continued on page 30A)

ELIMINATE
HAZARDOUS
LINESHAFTING

Specifically designed to individually motorize machine tools originally driven by lineshaft, LIMA GEARSHIFT DRIVES were selected by Ohio State University to provide its students with the very best in modern machine shop equipment.

Ohio State is but one of many schools throughout the nation that have modernized their machine shops with LIMA DRIVES, providing the utmost in functional safety, adequate lighting, proper machine location and the complete elimination of hazardous lineshafting.

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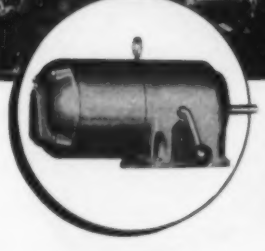
Industrial Engineering Department



• *Selective Speed* LIMA GEARSHIFT DRIVES for application to all types of machine tools and production equipment are built in sizes from ½ to 25 HP.

Complete engineering facilities available.

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Representation in principal cities
GEARSHIFT DRIVES & MOTORS
THE LIMA ELECTRIC MOTOR COMPANY
3451 FINDLAY ROAD • LIMA, OHIO

NEW PUBLICATIONS

(Continued from previous page)

Indian Silversmithing

By W. Ben Hunt. Cloth, 160 pp., 6⅞ by 10½ in., illus., $4.75. The Bruce Publishing Co., Milwaukee 1, Wis.

A beautiful book on an exceedingly interesting hobby. It may interest the reader to know that every one of the articles shown and described in this book was made by the author. He has personally experienced the attraction which a beautiful piece of silver work has on those who can really appreciate the jewelry that the Indians produce with the simplest kinds of makeshift tools.

In his directions, the author continually emphasizes the fact that the beginner can make many of the tools he will use, and that in making one's own tools, the expense of working with silver can be kept down to a modest amount

The directions for making the 35 projects described and illustrated in this book are concise and to the point. The illustrations, whether they are half tones or line drawings, clearly show what the author intended them to show. The color plates that have been chosen for the book are so beautiful that the beginner will want to make not only beautiful silver work, but he will want to decorate it with turquoise as well.

Fundamental Jobs in Electricity

By Edgar C. Perry and Harry V. Schafebook. Cloth, 306 pp., 6¾ by 9½ in., illus., $3.60. McGraw-Hill Book Co., Inc., New York City.

A fine text for the beginner.

The authors have arranged 134 jobs which require the learner to make tests that show the conducting and insulation properties of materials. Other jobs show him how to construct various kinds of batteries, and how permanent and electromagnets are constructed. He also is required to make series and parallel circuits and connections; study the telephone, telegraph, radio, and fundamental electronic circuits; and learn about light and power generation.

Electric refrigeration, auto electricity, and electricity for the farm also are treated.

Safety, an electrical glossary, abbreviations, a bibliography, and a correlated list of visual aids also are part of the text.

The book contains many questions for discussion, and electrical problems which the student must solve.

(Continued on page 30A)

ATF **Good School News**

GRAPHIC ARTS—THE EDUCATIONAL FIELD WITH A FUTURE

American Type Founders, Department of Education, 200 Elmora Avenue, Elizabeth, New Jersey

Tucson Senior High School Has Outstanding Success With Graphic Arts Department

Three-fold objective: to provide (1) general educational, (2) avocational, (3) vocational training

The graphic arts department of the Tucson, Arizona, Senior High School was established in 1940 under the direction of Otis H. Chidester with 80 students enrolled.

Today, it has grown to an enrollment of 400-450 students and is housed in a new $1,500,000 vocational building, modern in every respect. Basic layouts for printing areas were done by the ATF Department of Education.

The objectives of the department are three-fold: (1) general educational, (2) avocational, (3) vocational. All students must take beginning graphic arts before electing either advanced printing or photography, or a combination of the two courses.

During the first year they take home such projects as name cards, personal stationery, book plates, imprinted napkins, personalized memo pads, albums, photograph film and prints. During this year they also explore as many of the related graphic arts fields as possible.

In the second year, the students work on live jobs such as school programs, tickets, posters, awards, school forms, literary publications, publicity. In this way they are trained to meet deadlines, work under industrial conditions, and produce the finished products to pass standards set up by a consuming public. It is also felt that the fact that the students have quality printing for their school affairs and school business is creating an intelligent buying public for the printing industry.

From the advanced courses, capable students are recommended to the printing trade. Thus, the school maintains a wholesome relationship with employers and unions and is able to place all students recommended, either in the southwest, or even in midwestern and eastern areas. Many students in the last two years of school are employed locally after school and holidays. Unions and employers are recognizing the ability of students from this department by up-grading them from one to three years during apprenticeship.

Graphic Arts Courses in All New York City Junior High Schools

Graphic arts departments have proved highly successful in the 53 junior high schools throughout the five boroughs of New York City.

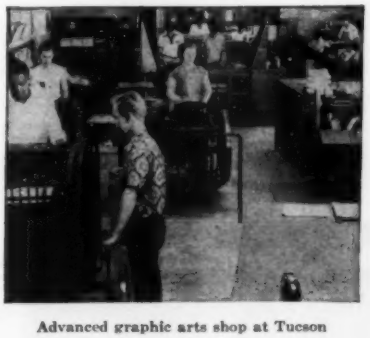
According to Robert Cynar, industrial arts supervisor, the principal purpose of these courses is to familiarize students with the processes by which written words become printed pages and the processes by which a drawing becomes a print.

The aim of these non-vocational schools is to teach basic skills, and, more important, to stimulate students' interest in academic subjects through this medium.

Beginning graphic arts shop at Tucson Senior High School

The Tucson graphic arts shop is divided into beginning lecture room, graphic arts laboratory, photographic lecture and work area, darkroom with contact printing and enlarging work area and two film handling rooms, advanced lecture room, vocational printshop, advanced photographic lecture and work area, darkroom with enlarging work area, four film handling rooms, portrait room, central stockroom.

Composing room of advanced graphic arts shop



Advanced graphic arts shop at Tucson

ATF has Specialized Department of Education Engineering Service

ATF maintains specialized services for vocational and industrial arts schools. Our Department of Education's engineering service is available to you.

Call on ATF today. Write for your copy of our booklet, *Career Opportunities in the Printing Industry*. Better printing from the widest line of processes—*gravure . . . letterpress . . . offset.*

TEACHING MATERIALS

(Continued from page 28A)

Standard Oil Company of California
225 Bush Street
San Francisco 20, Calif.
It's Up To You, 16mm. sound, color, 23 min.
The Amazing Legacy of Rudolf Diesel, 16mm. sound, black and white, 25 min.

Texas Company, The
135 East 42nd Street
New York 17, N. Y.
Deep Horizons, 16mm. sound, color, 30 min.
Masters of Molecules, 16mm. sound, color, 25 min.
Research — Pattern for Progress, 16mm. sound, color, 25 min.
It's Mighty Cheap Insurance, 16mm. sound, color, 30 min.
The Last Ten Feet, 16mm. sound, black and white, 22 min.
24 Hours of Progress, 16mm. sound, black and white, 28 min.

Union Pacific Railroad Company
422 West Sixth Street
Los Angeles 14, Calif.
Nature's Art Gallery, 16mm. sound, color, 30 min.

United States Bureau of Mines
Experiment Station
4800 Forbes Street
Pittsburgh 13, Pa.
The Story of Lubricating Oil, 16mm. sound, color, 21 min.
Automobile Lubrication, No. 151, 16mm. silent, 1 reel
Made in co-operation with Standard Oil Company (Indiana)
The Evolution of the Oil Industry, No. 153, 16mm. silent, 4 reels
Made in co-operation with Sinclair Refining Company
Making a V-Type Engine, No. 157, 16mm. silent, 2 reels
Reel 1: Unloading Iron Ore from boat
Reel 2: Filling Crankshaft Molds
Made in co-operation with Ford Motor Company
Lubrication, No. x191, 16mm. sound
Made in co-operation with Sinclair Refining Company
Story of a Spark Plug, No. x189, 16mm. sound
Made in co-operation with Champion Spark Plug Company
Petroleum and Its Uses, No. 202, 16mm. sound
Made in co-operation with Sinclair Refining Company
Airplanes — Their Metals, Fuels, and Lubricants, No. x211, 16mm. sound
Made in co-operation with Sinclair Refining Company
The Power Within, No. x236, 16mm. sound
Made in co-operation with General Motors Corporation

United States Government Printing Superintendent of Documents
Washington 25, D. C.
Film Bibliography of Aviation and Related Fields. (Civil Aeronautics Administration) Cat. No. C 31.102: F 48/2/949, 40¢

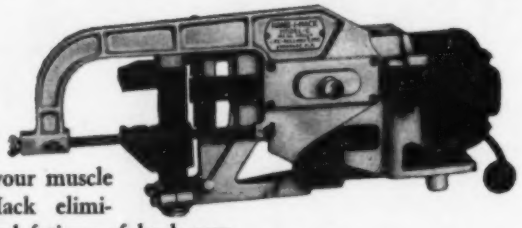
University of Kansas
Bureau of Visual Instruction
University Extension
Lawrence, Kans.

(Continued on page 32A)

Goodbye Elbow Grease!

Use HAND-I-HACK* Portable POWER HACK SAW

Take it Easy—



let electricity do your muscle work! Hand-I-Hack eliminates the sweat and fatigue of hack sawing. Plugs into any wall or light socket. Truly portable — can be carried anywhere with one hand. Has swivel vise — operates in any position: horizontally, vertically, at an angle, even upside down. Maximum capacity: 3" x 3" square cut. Uses lower cost standard 10" hand blades — will cut solid bar stock and thin wall tubing, pipe, conduit, cable, rolled forms, etc.

Cutting small diameter brass tubing, using wood block false jaws.

Making a square cut on solid 3" steel bar.

- INSTRUCTORS: Write today for full information.
- SCHOOL SHOP DEALERS: Write for our dealer proposition.

*T.M. Reg. U.S. Pat. Off.

Lipe-ROLLWAY CORPORATION
Manufacturers of Automotive Clutches and Machine Tools
Syracuse 1, N. Y.

NEW PUBLICATIONS

(Continued from page 28A)

Electrical Engineering — Theory and Practice

By W. H. Erickson and N. H. Bryant. Cloth, 523 pp., 6⅛ by 9¼ in., illus., $6. John Wiley & Sons, Inc., New York City.

This book was thoroughly tried out in mimeographed form on classes of mechanical, civil, and chemical engineering students.

The material lays stress on the analysis and study of electrical circuits, electronics, and machines.

It is arranged so that it can be used for short unit courses or it can be laid out for courses that will extend over two or three semesters.

A series of related problems have been added at the end of every chapter.

Applied Leathercraft

By Chris H. Groneman. Cloth, 210 pp., 5⅝ by 8½ in., illus., $3.95. Chas. A. Bennett Co., Inc., Peoria 3, Ill.

This book gives the student an excellent idea of how leather is prepared for use; from what part of the United States and other countries of the world the skins out of which leather is made, is obtained; and the kinds of leather that are used for arts and craft work.

There are 12 or more projects carefully outlined, each accompanied by alternate designs and suggestions for ornamenting the finished pieces.

There also is a chapter on making ladies' gloves.

How to Pass Radio License Examinations

By Charles E. Drew. Paper, 367 pp., 6⅛ by 9¼ in., illus., $4.50. John Wiley Sons, Inc., New York 16, N. Y.

This is the third edition of this book. The entire material is arranged in question and answer form, and presents the information needed by applicants for licenses on the basic laws, operating practices, basic radio-telephone, the advanced radio-telephone, radio-telegraph operating practice, and the advanced radio-telegraph.

Auto-Mechanics (Book Six) — Frame and Body Maintenance

By Ray F. Kuns. Paper cover, 503 pp., 5⅜ by 7½ in., illus., $2.50. The Bruce Publishing Co., Milwaukee 1, Wis.

This is the sixth book in this helpful series. It discusses in concise terms what tools to use,

(Continued on page 35A)

New BERGER drafting kit for students will make your teaching job easier... help your classes learn faster

Zips up ALL student's drafting tools in one easy-to-carry case

PATENT PENDING

It's easier to bring all these tools to class than to leave any at home!

With this new, all-in-one drafting kit, your students will really be "present" in class, fully-equipped with every tool they need... every day. Your sessions will get under way promptly. No interruptions by students tapping on their neighbors' shoulders—no piercing whispers begging the loan of a protractor, a triangle, a scale.

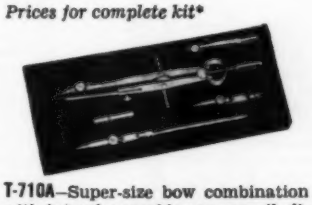
The Berger Drafting Kit is complete. It includes: your choice of 8 different sets of drawing instruments, protractor, architect's scale, engineer's scale, 8″ and 10″ triangles, French curve, draftsman's tape, pencils, pencil pointers and erasers. Inner compartments hold drawing and note papers—all in attractive, durable, 16″ x 24″ simulated leather carrying case of scuff-proof, waterproof Texon.

Every drafting student in your classes should own this handy, practical learning aid. He'll find it indispensable throughout your course, use it in college and as a professional. You'll find it indispensable as a teaching aid.

Tell your students about the Berger Kit—and tell us how many you need. It costs so little—in some cases less than buying the items individually. Use the order blank at the right.

YOUR CHOICE of drawing set with each drafting kit

*Prices for complete kit**



T-710A—Super-size bow combination with interchangeable pen, pencil, divider parts. Bow 6½″ long. Circles to 8½″ diameter... **$11.38**

S-510... $13.35

C-2400... $17.34
Available with side wheel bows (S-2400)... **$16.77**

T-708... $14.80
Available with side wheel bows, without divider (T-608)... **$12.78**

Drawing sets are precision-made in American Zone of Germany. In velvet-lined cases.

**Prices quoted are for quantities of 6 or more kits. Instructors may buy sample kit at same low price.*

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MATERIALS AND EQUIPMENT FOR ENGINEERS, ARCHITECTS, SURVEYORS AND DRAFTSMEN

TEACHING MATERIALS

(Continued from page 30A)

Aerodynamics — Problems of Flight, sf $1.25
Aerodynamics — Theory of Flight, sf $1.25
Air All Around Us, sf. $1.25
Air in Action, sf $1.25
Airplane Changes Our World Map, sf $1.25
Airplane Trip, sf $1.25
Air Transportation, sf $1.25
Automotive Service, sf $1.25
Bad Weather Driving, sf $1
Caravans of Trade, sf $2.50
Development to Transportation, sf $1.25
Diesel, the Modern Power, sf 75¢
Story of Gasoline, sf 75¢
History of Aviation, sf $3.75
Know Your Car, sf $1
Lubrication, sf $1
Problems of City Driving, sf $1
Safest Way, sf $2
Safety — For Safety's Sake, sf $2
Safety in the Home, sf $1.25
Water Power, sf $1.25
Bicycling with Complete Safety, sf $1
The Driving Test, sf $1.25, 11 min., 16mm. sound
Airplanes and How They Fly, 16mm. sound, sf $1.25, 11 min.
Bicycle Safety, 16mm. sound, 11 min., sf $1.25

Venard Organization, The
Peoria 2, Ill.
A World of Power, sound color film, 28 min.

White Motor Company, The
Sales Promotion Department
842 East 49th Street
Cleveland 1, Ohio
Wheels Away, sound slide film with record, 30 min.
Horizons Unlimited, 16mm. motion, 17 min.
The Truck That Tilts Its Cab for Service, 16mm. sound, 15 min.
Demonstration of Crash Tests Used in Proving Durability of White 3000, 16mm. sound, 10 min.
To New Horizons, 16mm., 17 min.

Willard Storage Battery Company
246–286 East 131st Street
Cleveland 1, Ohio
The Story of the Storage Battery, 16mm. sound

Young America Films, Inc.
18 East 41st Street
New York 17, N. Y.
Safety on the School Bus, 16mm. sound

WOODS

American Walnut Manufacturers Association
666 North Lake Shore Drive
Chicago 11, Ill.
American Walnut, 16mm. sound, color, 22 min.

Associated Cooperage Industries of America, Inc.
408 Olive Street
St. Louis 2, Mo.
Helping America Deliver the Goods, 16mm. sound, color, 25 min.
The Container on Wheels, 16mm. sound, color, 25 min.

Bureau of Communications Research, Inc.
13 East 37th Street
New York City 17, N. Y.
Trees for Tomorrow, 16mm. sound, 18 min.

California Redwood Association
405 Montgomery Street
San Francisco 4, Calif.
Sempervirens, 16mm. sound, color, 30 min.

Denver and Rio Grande Western Railroad
605 Rio Grande Building
1531 Stout Street
Denver 1, Colo.
Douglas Fir Plywood, 16mm. sound, color, 45 min.

Douglas Fir Plywood Corporation
301 Tacoma Building, Tacoma 2, Wash.
848 Daily News Building, Chicago 6, Ill.

(Continued on page 35A)

NEW!
Packaged Metallic Rectifiers

Supplement Your M-G Power Supply

5-kw Selenium Rectifier Power-Conversion Unit

Permits Study of Rectifier Characteristics

These Rectifiers will enable your students to perform experiments that will familiarize them with the characteristics of this modern power-conversion unit.

Static metallic rectifiers are receiving wide recognition in industry due to the inherent advantages of low installation cost, high efficiency and good regulation.

General Electric's new Selenium Rectifiers, supplying low-ripple d-c, are a convenient supplement to conventional rotating motor-generator sets.

Rectifier Units Equipped With:

3ϕ, full-wave selenium rectifier stacks
Insulated delta-wye transformer
Three-pole a-c contactor with thermal overload protection
Forced-air fan (on 7.5-kw units & above)

Electrical Characteristics:

Efficiency: between 81 and 85%
Regulation: between 8 and 13%
Power factor: 95% or better
Ripple: about 4%

Ratings and Ranges:

Input: 208, 230, 460 volts, 3ϕ, 60 cycle
Output: 125 or 250 volt d-c, 0.75 to 25 kw.

Write for fully illustrated Bulletin GEA-5658, containing wiring diagrams, performance curves, and application information to: General Electric Company, Sect. E687-72, Schenectady, N. Y.

687-72

GENERAL ELECTRIC

Personal News

NAMED ASSISTANT U. S. COMMISSIONER FOR VOCATIONAL EDUCATION

Joseph R. Strobel, former Ohio director of vocational education, was appointed assistant commissioner for vocational education in the Office of Education.

Dr. Strobel, who took on his new duties on July 1, succeeds Dr. Raymond W. Gregory, who has been named special assistant to the U. S. Commissioner of Education.

APPOINTED TO FEDERAL APPRENTICESHIP BOARD

Joseph P. Donovan, president, Donovan and Sullivan Engraving Co., Boston, Mass., has been appointed to the Federal Committee on Apprenticeship.

During the past year, the following members were also appointed to the Federal Committee: James A. Brownlow, president, Metal Trades Department, American Federation of Labor, Washington, D. C.; Michael Fox, president, Railway Employees Department, American Federation of Labor, Chicago, Ill.; and R. J. Thomas, assistant director of Organization, Congress of Industrial Organizations, Washington, D. C.

The Federal Committee on Apprenticeship has been of great assistance in obtaining the wholehearted support of both labor and management for the apprenticeship program.

DR. CALVERT APPOINTED EDITOR-IN-CHIEF

Dr. Everett T. Calvert has been appointed editor-in-chief of American Book Company as of September 1, 1952. Dr. Calvert, for the past 11 years principal of Washington Elementary School, Pasadena, Calif., is a graduate of LaVerne College (A.B., 1931) and Yale University (Ph.D., 1942). A native of California, he has taught in one-teacher rural elementary and in urban high schools there, at the University of Southern California, and at Yale. His field is education, with specialization in curriculum, child development, and administration.

In his new position, Dr. Calvert will succeed W. W. Livengood, of the editorial staff of Amer-

(Continued on page 38A)

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Available TO SCIENCE AND VOCATIONAL INSTRUCTORS

This new bulletin provides complete assistance in the selection of proper electrical indicating instruments for use in modern schools and colleges. All basic instruments are grouped in *accuracy classifications* for quick reference . . . with special groupings for multi-purpose and special instruments, instrument accessories, etc. Also lists valuable teaching aids available at Weston. Write for your copy on your school letterhead . . . WESTON Electrical Instrument Corporation, 617 Frelinghuysen Avenue, Newark 5, New Jersey . . . *manufacturers of Weston and TAG instruments.*

905 **WESTON** *Instruments*

IT'S EASIER TO TEACH accurate workmanship with the *Kalamazoo* METAL CUTTING BAND SAW

Model 610 cuts 6" round and 6" x 10" flat. Coolant equipment available.

That's why the Kalamazoo, so popular in industry, is used by so many schools.

Accuracy of a few thousandths is easy to maintain, whether cutting bars, rounds, angles or odd shapes. There's minimum kerf . . . no burr. What's more, the Kalamazoo is *safe* to use. Saw blade is almost completely enclosed . . . no exposed pulleys or gears.

Three sizes available. Each can be had with casters for complete portability. Send for full details *now.*

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JOHNSON No. 120
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- **1500° F. in 5 minutes**
- **2300° F. in 30 minutes**

This modern furnace gives you the temperatures you want for heat treating carbon and high speed steels, tools, dies and small metal parts. Fast warm up saves classroom time. Easily regulated with accuracy. Uses natural, mixed, artificial, or bottled gas. Very economical in operation. Firebox 5 x 7¾ x 13½. Complete with Carbofrax hearth, G.E. motor and Johnson blower.

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Also available in Bench Style

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TEACHING MATERIALS

(Continued from page 32A)

1232 Shoreham Building, Washington 5, D. C.

The 500 Fifth Avenue Building, New York 18, N. Y.
Miracle in Wood, 16mm. sound, color, 35 min.
The Plywood Fleet, 16mm. sound, color, 35 min.
Prefabricated with Plywood, 16mm. sound, color, 32 min.
Plywood on the Farm, 16mm. sound, color, 30 min.
How to Finish Plywood, 16mm. sound, color, 22 min.

Fir Door Institute
1205 Rust Building
Tacoma 2, Wash.
The Doorway to Happiness, 16mm. sound, color, 30 min.

Forest Industries Information Committee of Minnesota
516 Lyceum Building
Duluth 2, Minn.
Harvesting the Forest Crop in Minnesota, 16mm. silent with titles, 1200 feet, 33 minutes sound speed, 45 minutes silent speed

General Motors Corporation
Department of Public Relations — Film Section
General Motors Building
Detroit 2, Mich.
Requests from Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming address to:
General Motors Corporation
508 San Francisco Building
405 Montgomery Street
San Francisco 4, Calif.
Requests from Greater New York City and the communities of Long Island address to:
General Motors Corporation
Department of Public Relations
1775 Broadway
New York 19, N. Y.
The ABC of Hand Tools, 16mm. sound, color. Part I — 18 min., Part II — 15 min.

Hercules Powder Company
Wilmington, Del.
Our Part of the Job, 16mm. sound, color, 20 min.

Mahogany Association, Inc.
75 East Wacker Drive
Chicago 1, Ill.
Mahogany — Wood of the Ages, 16mm. sound, color, 40 min.
The Romance of Mahogany, 16mm. silent, 45 min.
Modern Masterpieces in Mahogany, 16mm. silent, 30 min.

Masonite Corporation
111 West Washington Street
Chicago 2, Ill.
The Story of Presswood, 35mm.
Hardboard — Advantages and Uses in Homes, 35mm., 1 hr.
Hardboard for 1001 Uses, 35mm., 1 hr.

Northeastern Lumber Manufacturers Association
271 Madison Avenue
New York 16, N. Y.
The Story of Wood in the Northeast, 16mm. sound, color, 28 min.

Southern Hardwood Producers, Inc.
805 Sterick Building
Memphis 3, Tenn.
The Southern Hardwoods — Yours Forever, 16mm. sound, color, 30 min.

Southern Pine Association
Canal Building

(Continued on next page)

NEW PUBLICATIONS

(Continued from page 30A)

and how and when; how frames, bodies, fenders, doors, hoods, deck covers, body hardware and the like, are reconditioned; how glass is replaced; bodies painted and refinished; spray coatings applied; and welding done.

The correct method of cleaning the car, inside and outside, also is well explained and will be a valuable and useful lesson to many who take auto mechanics.

Vocational Guidance Manuals

Published by Vocational Guidance Manuals, Inc., 45 West 45 St., New York 19, N. Y. Paper cover, 5⅜ by 7¼ in.

The following titles have been added to the list of those already offered by this firm:

Opportunities in Teaching by Benjamin Fine, 112 pages.

Opportunities in Social Work by Joseph P. Anderson, 112 pages.

Opportunities in Occupational Therapy, by Marie Louise Franciscus, O.T.R., 112 pages.

Opportunities in Library Careers by Robert E. Kingery, 112 pages.

Opportunities in Nursing by Edith Patton Lewis, R.N., 128 pages.

Opportunities in Beauty Culture by Florence E. Wall, 112 pages.

Opportunities in the Printing Trades by Patrick Boughal, 112 pages.

Opportunities in the Petroleum Industry by Gene Patrick, 95 pages.

Building Trades Blueprint Reading and Sketching

Spiral binding, paper cover, 193 pp., 8 by 10¼ in., $2.50. A joint development of the Connecticut State Education Department and Delmar Publishers, Inc., Albany 1, N. Y.

A very useful test for those teaching the building trades.

It consists of three parts, the first of which introduces the beginner to the very necessary study of the principles of the use of lines, dimensioning, arrangement of views, and the recognition of these various principles in blueprints of drawings made by others.

The second section is devoted to making building trade sketches, and the third section to the actual reading of blueprints.

(Continued on next page)

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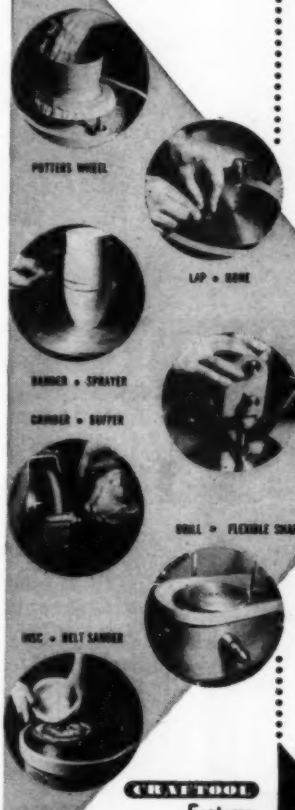

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TEACHING MATERIALS

(Continued from previous page)

New Orleans, La.
The Inside Story of a Good Home, sound-slide film
The Inside Story of a Good Home, 35mm. filmstrip with narration on a 16" transcription record. The record requires slow speed play back, 33-1/3 r.p.m.

United States Bureau of Mines
Experiment Station
4800 Forbes Street
Pittsburgh 13, Pa.
The Story of Rock-Wool Home Insulation, No. x193, 16mm. sound
Made in co-operation with Johns-Manville Corporation

United States Department of Agriculture
Motion Picture Service
Washington 25, D. C.
One Match Can Do It, 16mm. sound, 10 min.
Only, a Bunch of Tools, 16mm. sound, 21 min.
Pine Ways to Profit, 16mm. and 35mm. sound, 20 min.
Ten Thousand Fires, 16mm. sound, color, 20 min.
Then It Happened, 16mm. sound, color, 10 min.

University of Kansas
Bureau of Visual Instruction
University Extension
Lawrence, Kans.
Trees for Tomorrow, sf 75¢

Veneer Association, The
600 South Michigan Avenue
Chicago 5, Ill.
Faces and Figures, 16mm. sound, color 30 min.

West Coast Lumbermen's Association
1410 Southwest Morrison Street
Portland 5, Ore.
The Story of West Coast Lumber — A Permanent Timber Supply for America, 66 frames, 35mm., black and white filmstrip
Fighting Fires in West Coast Woods (Forest Protection), 35 2" x 2" Kodachrome slides with teacher's manual containing description of each slide and reference material
Harvesting Trees in West Coast Forests (Logging), 35 2" x 2" Kodachrome slides with teacher's manual containing description of each slide and reference material
Lumber for Homes, 16mm. sound, color, 21½ min.

Western Pine Association
510 Yeon Building
Portland 4, Ore.
Harvesting the Western Pines, 16mm. sound, 30 min.
Fabricating the Western Pines, 16mm. sound, 35 min.
Building a Home with Western Pines, 16mm. sound, 25 min.

Weyerhaeuser Sales Company
First National Bank Building, St. Paul, Minn.
P.O. Box 629, Newark, N. J.
Tacoma Building, Tacoma, Wash.
Green Harvest, 16mm. sound, technicolor, 29 min.
Trees and Homes, 16mm. sound, technicolor, 30 min.

THE END

NEW PUBLICATIONS

(Continued from previous page)

Ruled sheets are provided for sketching assignments. Those for the orthographic and oblique sketches are crosshatched with horizontal and vertical lines into ¼-in. squares.

Those for isometric sketching have vertical ruled lines and horizontal axis lines ruled at 30 deg.

Section three is devoted to the practical application of blueprint reading and the assignments are based on the three folded-in blueprints found in this section.

The appendix contains review tests and additional sketching problems.

Making Your Home Furnishings

By D. Joseph Di Bernardo. Cloth, 242 pp., 6¼ by 9¼ in., illus., $3.16. D. Van Nostrand Co., Inc., New York, N. Y.

This book presents in detail information about upholstering, refinishing, and decoration in the home. Complete directions are given for five different aspects of interior decoration — upholstering or reupholstering furniture, finishing or refinishing furniture, judging and selecting fabrics, making and using slip covers, and making and using draperies. Every operation is explained in step-by-step detail and is illustrated by a series of hands-at-work pictures that are easy to follow. For those interested in the artistic aspects of interior decorating there is also an appendix on period furniture.

Craft Adventures for Children

By Gretchen Grimm and Catherine Skeels. Paper cover, spiral binding, 110 pp., 6 by 9 in., illus., $2. The Bruce Publishing Co., Milwaukee 1, Wis.

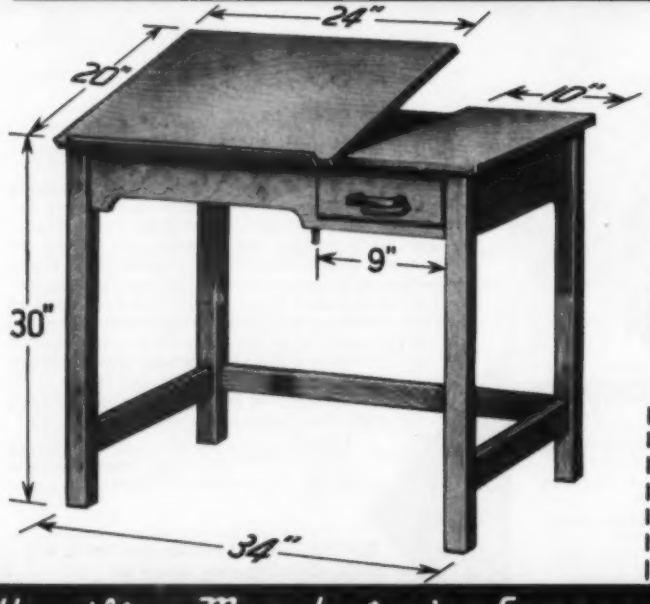
A book of interesting projects that will hold the attention of children 6 to 13 years of age.

There are approximately 55 projects, each clearly illustrated and described so that the youthful reader will have little trouble in following directions.

About one twentieth of all motor fuel consumed in the U. S. is used on farms. — *Petroluem Newsnotes*, American Petroleum Institute, New York City.

by Hamilton

STUDENT TABLE V-1704



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by Hale, McGinnis, and Hill

Covers 6 to 9 week program in elementary mechanical drawing

Helps students acquire knowledge and skill in making simple working drawings and interpreting them. This book is divided into 12 units, each embodying one of the fundamental principles of drafting. Written for the junior high school level, this book covers a 6 to 9 week program in drafting in a general shop program. 80 pages. Price, 80¢

"GENERAL DRAFTING"
By Fryklund & Kepler. A textbook for the first year of drafting. Easy to read. $1.25

"BLUEPRINT READING AND SKETCHING"
By Lightle. Beginning text in blueprint reading that requires solution of problems. 80¢

"DRAWING APTITUDE TEST"
By Mitchell. Specimen set. 35¢

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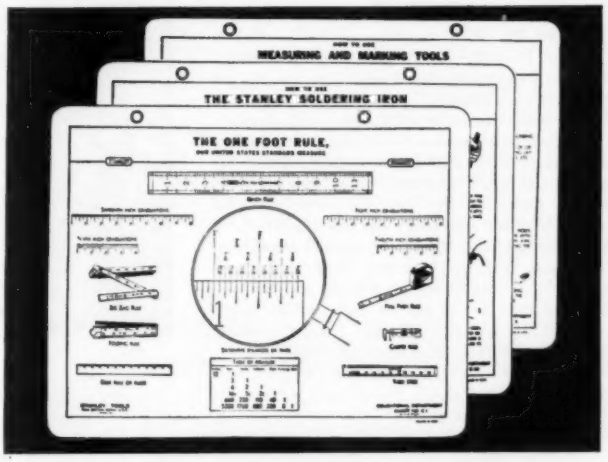

More and more shop teachers are finding Stanley instruction charts time-savers and effective aids for teaching and demonstrations. The charts now are larger size and six new ones have been added. 38 charts in all—they give all the important tool facts for common woodworking and several metalworking tools. And the extra large size, 27½" x 20½", makes it easy for a large group to read them. Order a set for your school—especially for beginners' classes. Sold at cost, $5.50 a set, delivered anywhere in the U. S. In Canada, $7.25 postpaid.

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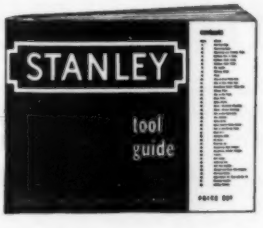
For your students, Stanley offers the Revised Edition of the Tool Guide. Pages carry the same material as the large charts described above—38 in all—and are perforated and punched for 3-ring notebooks. Single copies are $.25 in the U. S. Ten or more, $.15 each. In Canada, 25c each. Prices cover postage.



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PERSONAL NEWS

(Continued from page 32A)

ican Book Company since 1912 and editor-in-chief since 1931. Mr. Livengood will assume new duties as executive assistant to the president.

Dr. Calvert will be located at the New York Office of American Book Company, 55 Fifth Ave., New York 3, N. Y., after September 1.

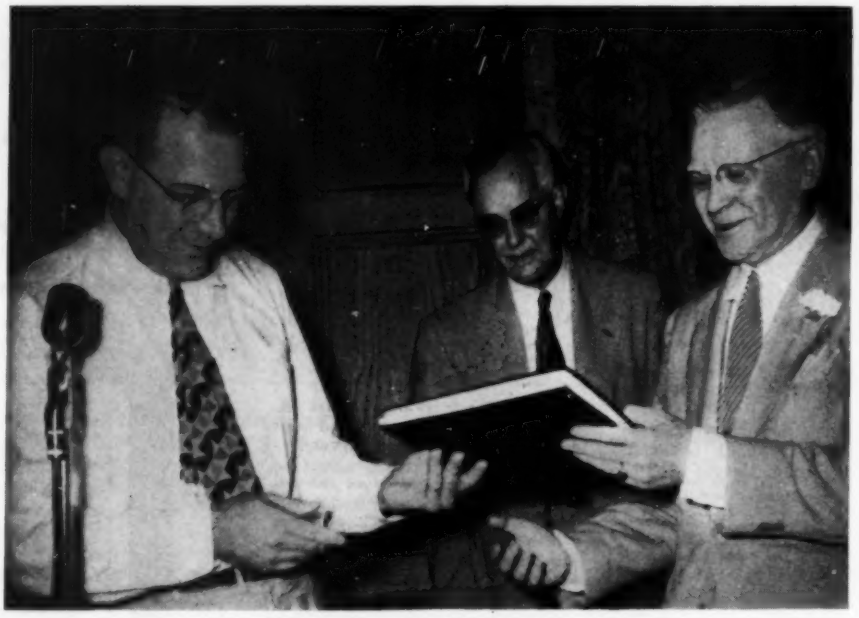
PROFESSOR ARTHUR B. MAYS HONORED

On June 26, 1952, approximately 200 friends of Arthur B. Mays gathered at the University Y.M.C.A., University of Illinois, Urbana, Ill., to honor him at a dinner.

There were laudatory speeches and presents for the man who had done so much for industrial education in Illinois and the country at large. There were touching references to how much he meant in the lives of many of those who attended the university and then entered the fields of industrial arts and vocational education.

No doubt it made him feel good to be surrounded by so many of his friends and to hear them aver that he would be sadly missed after he retired at the end of the present summer session. He showed a special interest when a volume of letters from close friends was presented to him, as is shown on the picture which accompanies this brief sketch.

His friends all wish him well and express the hope that he will be granted additional years in which to enjoy a well-earned rest.



Honor banquet for Professor Arthur B. Mays

Professor Mays was born at Round Rock, Tex., on July 25, 1887. He attended the University of Texas, Bradley Institute, Columbia University, and received the B.S. degree from Peabody College in 1919, and the M.A. degree in 1924.

He taught high school classes in Texas from 1905 to 1909, and at Sam Houston State Teachers College, 1909 to 1920. He was the director of vocational education at Camp Travis, Tex.,

(Continued on page 40A)

it was done with

HIGGINS INK

The Count of Monte Cristo plots revenge—and Lynd Ward's brushwork captures the novel's gloomy power.

The Illustration

Seemingly without care, Ward twists his brush to give weave to the cloak; blends lines and dabs for an *old* house; uses delicate cross-hatching for the brooding sky.

The Medium

Higgins American India Ink, employed with a #2 watercolor brush on coarse-grained paper. Ward says: "... the ink used must flow freely off the tip of the brush and at the same time give a rich uniform black in the solid areas. Higgins Ink is now, as it has been for over thirty years, an indispensable part of my working equipment."

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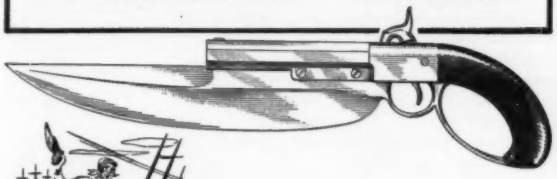
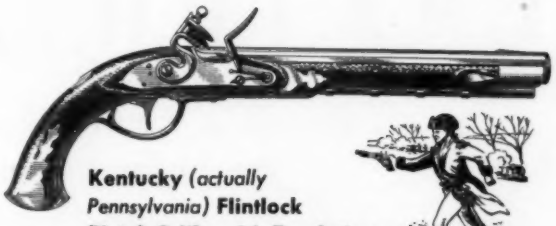


Elgin Cutlass-Pistol, Caliber .54, 1837 Model, made by C. B. Allen. Invented by George Elgin of New York, this formidable arm was intended to take the place of the cutlass and pistol commonly used by naval boarding parties. One of several variations of this weapon is the shorter Bowie-Knife Pistol.



Kentucky *(actually Pennsylvania)* **Flintlock Pistol,** Caliber .36, Revolutionary Period. Made by the same Pennsylvania gunsmiths who crafted the famous "Kentucky" rifles, these full-stocked pistols actually were rifles-in-miniature. Every "Kentucky" pistol is unique; the same gunsmith never made two alike.

Instant-heating Weller Soldering Gun for light or heavy work. Dual heat greatly increases tip life. Switch instantly to high or low heat as job requires. Pre-focused spotlights end "blind soldering". Exclusive tip-fastening arrangement assures full, constant heat. Shatter-proof plastic housing. Perfect balance. Low-cost, replaceable tips. Pays for itself in a few months. See at your Distributor or write for Bulletin direct.

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The Finest Soldering Tool for the Finest Craftsmen

PERSONAL NEWS

(Continued from page 38A)

1920 to 1921, assistant professor of industrial education at the University of Illinois, 1921 to 1927, and professor since that time to the present. He has been the head of the industrial education department since he joined the university in 1921.

He is a member of Phi Delta Kappa, Kappa Delta Pi, and Phi Kappa.

He has been vice-president in charge of industrial arts of the American Vocational Association and holds membership in such associations in the fields of industrial arts and vocational education as Vocational Guidance Association; National Association of Industrial Teacher Trainers; Illinois Vocational Association; and others.

He is also a prolific writer of books and magazine articles in the field of industrial education. His absence of active participation at the University of Illinois and in the affairs of state and national associations will be seriously felt, and his many friends and students in the field will deplore the fact that he will not be so easily reached in the future when help and kindly advice are necessary.

BRUCE D. RICHARDS DIES AT 67

Bruce D. Richards, head of the industrial-arts department at the high school, Carthage, Mo., for forty years, died July 6, 1952, after an extended illness. Mr. Richards was born January 22, 1885, on a farm near Lamar, Mo. He was graduated from Lamar High School and also the old Lamar college. He attended Southwest Missouri State College, Stout Institute, University of Wisconsin, and Kansas State Teachers College at Pittsburg. He joined the staff of Carthage High School in 1912 as head of the industrial-arts department. Under his supervision the department has become outstanding in the schools of Missouri.

Death ended a long and useful career on the part of Mr. Richards as a teacher in the field of industrial education. J. L. Campbell, superintendent of Carthage schools, said, "Bruce D. Richards gave four decades of service to the youth of our community as an instructor at Carthage High School — service that was marked by eagerness, interest, and a sincere appreciation of his opportunity to guide young people. He was a man in every sense of the word; loyal, respectful, efficient, co-operative, and an outstanding example of what constitutes true manhood."

Bruce D. Richards

Mr. Richards was alive to new developments in his field of work and was well read as was evidenced by his collection of professional magazines — a collection which he presented to Southwest Missouri State College a few years ago. Mr. Richard's influence will long be felt. — *Doyle Kemper.*

J. HENRY HOLLOWAY DIES

J. Henry Holloway, retired principal of the New York School of Printing, died on June 23 at the age of 74.

Mr. Holloway was the first head of the school when it was set up by the board of education in 1923 as the Central Printing Trades Continuation School. The school, considered the largest printing school in the world, had an enrollment of some 1200 high school students and 2000 apprentices to the printing trade.

FRANK L. MORSE DIES

Frank L. Morse, known as the "father" of vocational education in the Chicago public schools, died recently at the age of 87. Mr. Morse retired in 1934 after 25 years as principal of Harrison Technical High School, and 46 years as a teacher and administrator in Chicago schools.

His teaching career in Chicago began in 1888, when he was appointed teacher of chemistry in the old West Division High School. In January, 1909, he was transferred from Burr School, where he had been principal, to Farragut, then an elementary school. Immediately he went to work drafting plans for a high school which would incorporate vocational training in its curriculum.

(Continued on page 42A)

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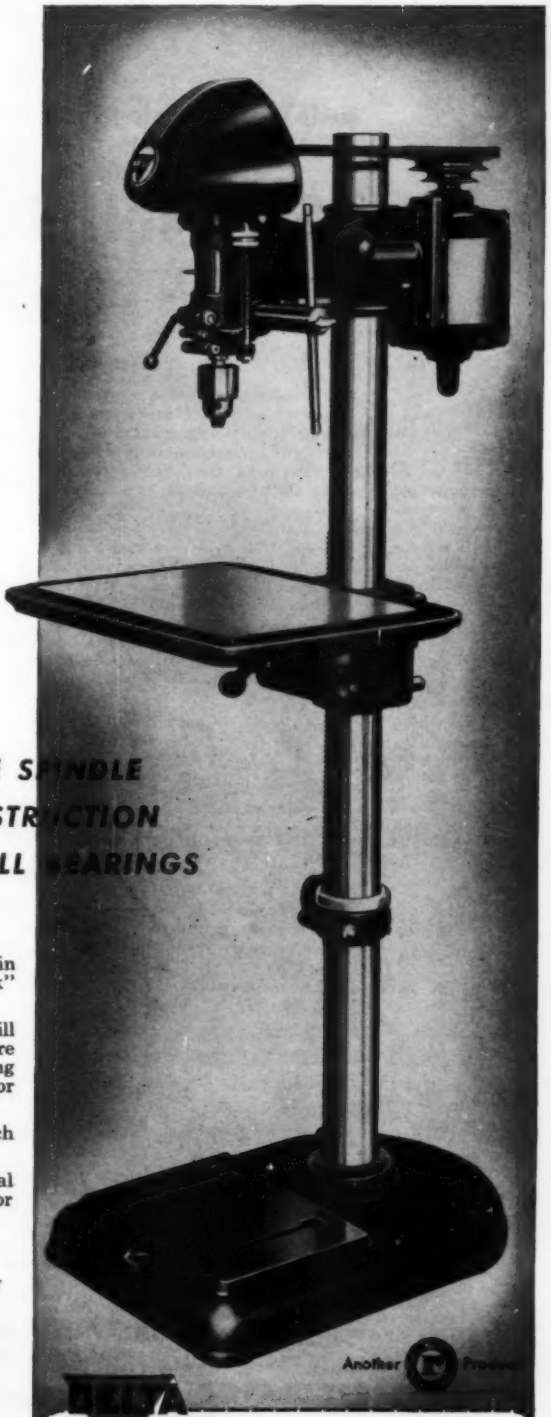

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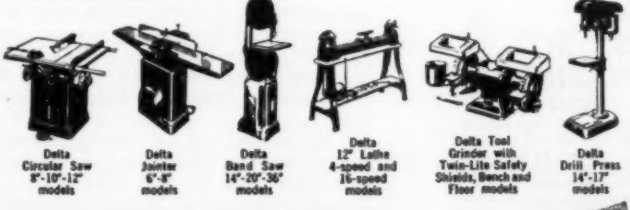

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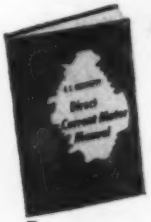

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PERSONAL NEWS

(Continued from page 40A)

As a result, Harrison was opened in September, 1909, with eight teachers and 178 pupils. At the time of his retirement the school had an enrollment of about 6000.

He was president of the Prairie Club of Chicago, an outdoor organization, from 1921 to 1924, and 1935 to 1944.

♦ Miss Mary McCalmont and H. M. Hansen of The Stout Institute, Menomonie, Wis., were honored at a dinner which was held on May 14, 1952, in recognition of their forty years of service to the school.

♦ Chris H. Groneman, head of industrial education, A. & M. College of Texas, College Station, Tex., served as guest professor for industrial education in the 1952 summer session at Oregon State College, Corvallis, Ore.

Summer guest professors supplementing the regular staff at the A. & M. College of Texas included Glenn Fletcher, director of industrial arts and vocational education, Houston, Tex., public schools; Rogers L. Barton, consultant for industrial arts, Texas Agency, Austin, Tex.; and H. O. Thomas, supervisor of industrial arts, State Department of Education, Baton Rouge, La.

♦ Dr. Lester R. Ford, chairman of the mathematics department at Illinois Institute of Technology, has retired from the Institute's teaching staff.

Dr. Ford is past president of the Mathematical Association of America, and was editor of the *American Mathematical* monthly, the association's magazine, from 1942 to 1946.

A graduate of the University of Missouri, where he received his A.B. degree in 1911 and his M.A. in 1913, he received his doctorate in 1917 from Harvard University. He is a fellow of the American Association for the Advancement of Science, and a member of the American Mathematical Society, the Mathematical Association of America, the Edinburgh Mathematical Society, the American Society for Engineering Education, Phi Beta Kappa, and Sigma Xi.

He has taught for over 40 years, the past 15 of which were at Illinois Tech and its predecessor, Armour Institute of Technology.

♦ Stephen Sworen, formerly head of the machine-shop department at the Kingston, Pa., Vocational School, has accepted the position of Trades Training Instructor at Daystrom Instrument Division at Archbald, Pa.

James Weaver succeeds Mr. Sworen as head of the machine-shop department at the Kingston Vocational School.

♦ Elmer G. Stacy, well-known expert in rotogravure, this summer joined the faculty of West Virginia Institute of Technology for the post graduate course leading to the degree of Master of Science in Printing.

♦ Dr. James H. Mulligan, Jr., has been appointed chairman of the Department of Electrical Engineering, New York University, New York City.

He received a B.E.E. degree in 1943 and an E.E. degree in 1947 from Cooper Union School of Engineering. His M.S. degree was awarded by Stevens Institute of Technology in 1945, and in 1948 he received a Ph.D. from Columbia University.

♦ Leonard J. Young has been appointed state itinerant teacher trainer for Negroes (trade and industrial) in Florida. Mr. Young will remain associate professor of industrial education at the Florida A. & M. College on a part-time basis.

News Notes

♦ The Ohio State University Industrial Arts Forums for the 1952 summer session had the following schedule:

June

20 Annual Get Acquainted Session. Reports of progress. Everyone introduced. Program planning session.

25 Pictorial Review of Industrial Arts Progress. With Harold G. Gilbert of Oswego, N. Y.

28 Annual Family Picnic. Glengarry Pool, 3:00–9:00 p.m. Highway 3 near Westerville. Bring your own food.

July

2 The Junior Achievement Movement. With Warren E. Parkinson, exec. dir., Junior Achievement, Inc.

9 Personnel Training in an Aviation Industry. With Harry W. Todd, Tr. director, North American Aviation, Inc.

16 Relationship of Industrial Arts to Physical Education. With Carl T. Nessley, phys. educ. dept., Ohio Univ., Athens. Joint Meeting with Lambda chapter of Epsilon Pi Tau. Annual public banquet, Lake Hope Lodge near Athens, 6:00 p.m.

23 New Horizons in Technology. With Admiral Edwin J. Taylor, dean, Ohio University, Athens. Annual public banquet, student union, 6:30–9:00 p.m., Rm. 331A. Annual (private) initiation, Student Union, 4:30 p.m., Rm. 329F.

30 International Evening: Handicrafts in India and Elsewhere. With Wayne D. Wardwell, industrial arts missionary to India.

August

6 Food for Tomorrow. An industrial research report. With K. Starr Chester of Battelle Memorial Institute Broadcast, WOSU. AM: 820 kc., FM: 89.7 mc.

13 The Handicraft Program of the Veterans Administration. With Taylor Foster, chief, educ. therapy, Chillicothe Hospital. Broadcast, WOSU. AM: 820 kc., FM: 89.7 mc.

20 The Annual Evening on Research Done Here and Elsewhere. With John A. Whitesel and the thesis writers.

Dr. William E. Warner presided at these meetings.

♦ The evening division of the University of Miami, Coral Gables, Fla., offered a course in "Home Mechanics" this summer via television for home viewers. J. Richard McElheny, chairman of the industrial education department, gave the course from the studios of WTVJ weekly at 1:30 p.m., Thursdays, beginning June 5.

The "telecourse" showed the average householder how and when to make minor repairs and insure proper maintenance. Emphasis was placed on how to foresee the need for household repairs, when the amateur should attempt the job, and when to call in expert repair service.

Mr. McElheny also demonstrated how to analyze household merchandise for good design, construction, and materials.

The eight half-hour "teleclasses" were supplemented by printed materials which could be obtained by mail from the Evening Division for

(Continued on next page)

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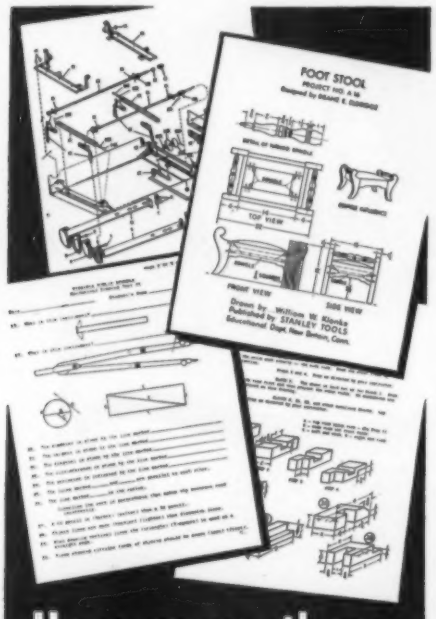

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NEWS NOTES

(Continued from previous page)

$1. These included a text, "Mister Fixum's Handy Hints," covering major points of the course, and an outline of the course content. The fee also entitled the "telestudent" to attend two question-and-answer clinics. These were held on the University campus, where Mr. McElheny met his "telestudents" for solutions of special, individual problems.

"Telelessons" included painting and decorating, furniture finishing and refinishing, plumbing hints, removal of dirt and stains from various materials, home handicrafts, electricity and electrical appliances, miscellaneous common repair and maintenance jobs, and "When the Auto Won't Start — Why?" Much of the course was directed to the needs of the housewife who is frequently faced by breakdowns in household equipment.

The series was produced by the University's radio and television department under the direction of O. P. Kidder, Jr.

♦ Utica Drop Forge & Tool Corporation has announced the establishment of two scholarships for undergraduate students at Stevens Institute of Technology.

This year the Stevens Faculty Committee on Student Aid designated two second-semester juniors, Laurence A. Minck of Yonkers, N. Y., and Robert A. Lohmann of Orange Grove, N. J. Hereafter the Faculty Committee will designate two students at the beginning of the sophomore year and the scholarships will be for the remainder of the college year.

These Utica Drop Forge Scholarships provide that the recipients accept summer employment with Utica Drop Forge. And, upon graduation, they are given an opportunity of employment with the firm, if they have previously proved satisfactory.

♦ Drafting tape may be more easily, economically, and neatly handled if strips are first laid down on the smooth surface of Masonite Tempered Presdwood. By cutting across six or eight strips with a razor, the draftsman creates a supply of clean-edged pieces available whenever he wants them. The tape tabs are removed clean from the surface, which may be used indefinitely. Handling the tape in this way was "discovered" by drafting employees of the Masonite Corporation sales engineering department.

♦ The construction of a $5,000,000 technical high school for white students will begin this fall at St. Louis, Mo., and will require several years for completion. It will be a five-story reinforced concrete structure fronting on McRee Avenue a block west of Kingshighway. The automotive and aeronautical shops will be in a separate one-story wing.

Upon completion of the new school, it is planned that Hadley Technical School, the existing institution for white students, will be made into a combined academic and technical high school for Negroes.

♦ The accompanying picture shows two award winners, elected as the outstanding seniors of the graduating class of 1952 of the industrial arts department at Western Michigan College, Kalamazoo, Mich.

This award is granted each year to the outstanding senior on the basis of an election by the faculty. The standard criteria for determining the winner are scholarship, leadership, and personality. This is the first time since 1941 that there have been dual winners. The bronze plaque, which is given to each winner, was designed and

Award winners — Richard Steele and Bruce Bacheller

finished by student members of the shops of the industrial arts department.

Reading from left to right, the names are RICHARD STEELE of Grand Rapids, Mich., and BRUCE BACHELLER of Ferndale, Mich.

♦ A new educational program, the Westinghouse-Johns Hopkins Awards in Elecrical Engineering for 1952, has been established to help deserving young people pursue careers in the field of electrical engineering.

The awards will enable thirty students a year to combine work experience at Westinghouse with technical studies leading to a Certificate in Electrical Engineering to be granted by McCoy College of The Johns Hopkins University.

It is a work-study program that has been inaugurated by industry at the college level.

Candidates will be selected on the basis of tests, school records, and recommendations and interviews. Those selected will be employed in one of the Westinghouse plants in the Baltimore area for 32 hours a week. They will be paid regular scale wages and will be given work-experience in keeping with their ability and in line with their studies.

For further information address *D. C. Lee, manager of industrial relations for Westinghouse, 306 Fourth Ave., Pittsburgh 30, Pa.*

CHEMISTRY INVOLVED IN SOLDERING*

ANTHONY LANFRI

San Jose, Calif.

There are several fluxes or chemical aids that are used in the soldering of various metals. An explanation of the chemical reactions that take place when these various fluxes and chemicals are used is briefly explained.

Sal Ammoniac
(NH_4Cl — Ammonium Chloride)

Ammonium chloride (sal ammoniac) is used to remove the copper oxide (CuO) that forms on the surface of a soldering copper. This is done that the copper may be coated with a thin layer of solder. The process is commonly referred to as *tinning the copper*. The copper oxide which forms on the exterior of a hot

*For valuable assistance in the preparation of the information presented herewith, many thanks are due to Donald Balcom, Natural Science Department, San Jose State College.

(Continued on page 46A)

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SOLDERING

(Continued from page 44A)

soldering copper prevents the solder from adhering to the surface. Therefore, ammonium chloride (NH_4Cl) is employed to break down the copper oxide (CuO) into substances which do not interfere with the tinning process. The forming of copper oxide (CuO) and the reaction of ammonium chloride (NH_4Cl) with copper oxide is chemically explained by the following equations:

1. $2\ Cu + O_2 + (heat) \rightarrow 2\ CuO$
2. $CuO + 2NH_4Cl + (heat) \rightarrow CuCl_2 + 2NH_3 + H_2O$

The products in the second reaction consist of a green substance — copper chloride ($CuCl_2$); a gas ammonia (NH_3); and water (H_2O).

Soldering Paste
(rosin and tallow mixture)

This mixture performs a dual purpose when used in soldering; namely,

1. Rosin removes oxides from the surface of the metal being soldered.

2. Tallow forms a protective coat over the metal after oxide has been removed so that the metal does not reoxidize before solder is applied.

In order to illustrate this by the use of chemical reactions, the soldering of tin will be considered. In this case, the tin oxide, which forms on the surface of tin when it is exposed to air for any length of time, is undesirable. The breaking down of this tin oxide into other less troublesome products is accomplished by the use of rosin as a soldering flux. The following equation explains the reaction of rosin, which contains acid (RCO_2H), on tin oxide (SnO) that results in the forming of a black residue [$(RCO_2)_2Sn$] and water (H_2O).

$2RCO_2H + SnO \rightarrow (RCO_2)_2Sn + H_2O$

Soldering Salts
($ZnCl_2$ — Zinc Chloride)

"Soldering salts" is used primarily as a cleansing agent to remove dirt and impurities from the soldering copper; however, it may also be used as a soldering flux. In this compound of zinc and chlorine, the zinc acts as a flux and combines with dirt and impurities to form a slag. Chlorine is employed in order to turn the zinc into a common water soluble salt. To explain the action of zinc as a flux in a reaction would be impossible. "Soldering salts" is, therefore, zinc chloride, a chemical compound, which may be used under proper conditions to remove dirt and impurities from the surfaces to be soldered.

Killed Acid
($ZnCl_2$ and HCl)[1] — Zinc Chloride and Hydrochloric (Muriatic) Acid

This so-called "killed acid" or "cut acid" is similar to soldering salts inasmuch as it contains a certain amount of zinc chloride. However, it is different because it also contains a certain amount of hydrochloric acid which is used to react with certain active metals, such as zinc, and the oxides of these metals. As previously explained, zinc chloride may act as a flux by combining with impurities; however, it does not act with other metals and their oxides in order to clean a surface in preparation for soldering. For this reason, some of the hydrochloric acid is left in *killed acid*, so that it may react with these different metals and their oxides to clean the surface of these metals in order that the solder may adhere readily. The preparation of *killed acid* is chemically explained by the following:

[1]Muriatic acid (HCl) is an acid which will destroy skin tissues and fibers of clothing; therefore, it must be used with care.

(Continued on page 49A)

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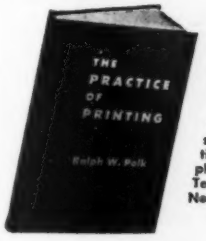

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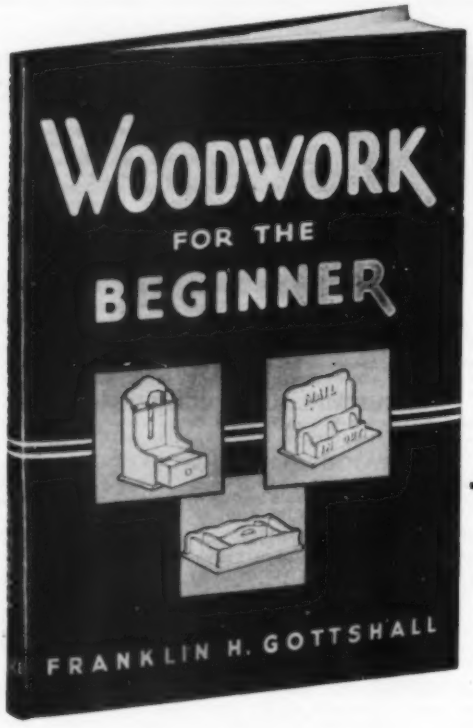

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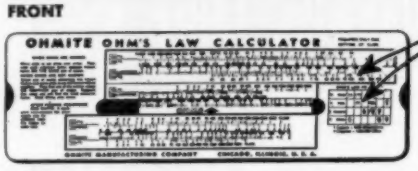

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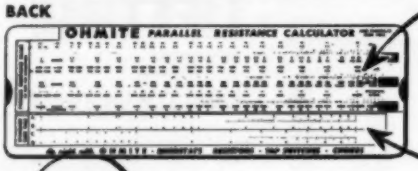

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SOLDERING

(Continued from page 46A)

Excess hydrochloric acid + zinc → zinc chloride + lesser amount of hydrochloric acid + hydrogen

Strips of zinc are added to hydrochloric acid in controlled proportions. The zinc being an active metal replaces the hydrogen in the acid, and it in turn escapes as a gas.[2] The amount of zinc chloride that is produced is determined by the amount of zinc that is added to the acid.

NOTE. Sulfuric acid should never be used in the place of hydrochloric acid because if sulfuric acid should come in contact with solder which is composed mainly of lead, the formation of inert and insoluble products such as lead sulfate ($PhSO_4$) might result.

Nitric Acid (HNO_3)[3] — (nitric acid)

Nitric acid may be used to clean copper oxide from the surface of copper in order that the solder may adhere. The following reaction explains the action of nitric acid upon copper oxide:

$$2HNO_3 + CuO \rightarrow Cu(NO_3)_2 + H_2O$$

[2]Hydrogen (H_2) must be kept from open flame for it is very combustible. For this reason *cut acids* should be prepared outside, away from open flames.

[3]Nitric acid (HNO_3) must be kept off clothes and skin for it will bleach the color from the clothes and destroy skin tissues.

NOTE. This acid should *never* be used any place where it comes into contact with solder for it will form insoluble and inert products, such as lead oxide (PbO) or tin oxide (SnO_2). Furthermore, the acid should be washed off immediately after the surface is cleaned. This is done in order to stop the reaction of the acid with the metal from continuing according to the following equation:[4]

$$Cu + 4HNO_3 \rightarrow Cu(No_3)_2 + 2NO_2 + 2H_2O$$

SUNBURNS IN INDUSTRY

DR. W. SCHWEISHEIMER
Rye, N. Y.

A most interesting calculation about the connection of sunburns and industrial absenteeism has been made by Louis Stambovsky. While about 60 million persons were employed in America during the war, at least half of them, or 30 million, indulged in some sort of outdoor activity during the warm months. Of these, 50 per cent or 15 million, indulged in sun irradiations far exceeding their safety tolerance. Such excesses resulted in 15 million burns — ranging in degree from mild discomfort to hospitalization.

Half of these 15 million actinic injuries, or seven and a half million, were of sufficient severity to cause the loss of one day's work. Conclusion is that industry loses about seven and a half million man-days in a single summer season, plus an indeterminate number of man-hours attributable to impaired efficiency, dislocation of schedules by absentees, etc. A review of Monday and Tuesday absenteeism during June, July, and August, Stambovsky says, showed that the worker's efficiency was at least decreased for one or more days.

[4]The brown gas (nitrogen dioxide — NO_2) given off in this reaction is very harmful when inhaled in large quantities as it will form nitric acid in the lungs.

Sunburn — Erythema

The tanning of the skin which follows exposure to sunlight is preceded by more or less redness (erythema) and sometimes by swelling and blistering. The pain is severe, contact with clothing is most unpleasant, belts or suspenders are unbearable. Shocks, chills, high fever, nausea are signs of severe sunburns.

When erythema, eczema, and eruptions — due to sunburn — disappear again the skin of brunette people may be left tanned while that of blondes is freckled. Pigmentation is a protective measure of the body against further injury by excessive rays. The ultra-violet rays of the sun are most effective — the more so where they are reflected by water, snow, or white chalky soil. The rays are most dangerous in spring and early summer when exposure takes place before protective tanning has formed.

L. Stambovsky gave a survey of today's

(Continued on next page)

Specify TOLCO for your SCHOOL SHOP

The T-14 represents the finest in school shop benches. The sturdy rock maple frame is mortised — tenoned and bolted for extra long life and rigidity. Work space for two students with ample project storage drawers. Beautiful natural finish.

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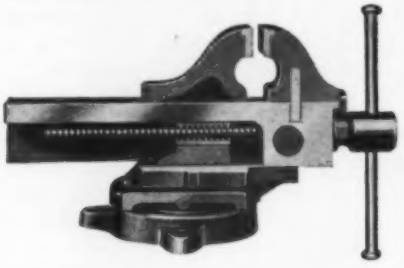

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Above: Rugged drill press and milling machine vise.

Below: Popular economy model continuous screw woodworker's vise.

DESMOND-SIMPLEX

STEEL SLIDE VISES

The Desmond-Stephan Mfg. Co. Urbana, Ohio

SUNBURNS

(Continued from previous page)

usual treatment of sunburns. Relief of pain should be the first objective. A good anesthetic ointment, of which there are several excellent proprietary brands available, should be generously applied and covered with thick layers of gauze to prevent contact removal. Cod-liver oil ointment, carron oil, and petrolatum are helpful as well. Absolute rest will hasten recovery. Ice compresses have been found to control itching sensations connected with sunburn. Diet should be light, with plenty of fluids.

Experiments by Luckeish show the effects of June sunlight at noon on the average untanned skin: after 20 minutes small erythema of the skin; after 50 minutes vivid erythema; after 100 minutes painful burn; after 200 minutes blistering burn. Ultraviolet reflections from the surface of water may increase the effects of direct rays as much as 100 per cent.

Most persons cannot or will not associate the warmth and relaxation of sunbathing as being a potential danger; warnings are disregarded. So, Stambovsky says, the use of an efficient sunburn preventive seems to be the only sure way of avoiding sunburns. These preparations may be in the form of creams, oils, or lotions. Their activity is dependent upon an ultraviolet screen or filter contained in solution or suspension. Esters of para-amino-benzoic acid have been found ideal for use in sunburn preventives, but there are many more chemical compounds suited for this purpose. An efficient sunburn preventive should not permit the passage of more than 25 per cent of the effective rays of the sun.

Sunstroke and Heat Stroke

We have to differentiate between the effects of the sun and those of heat on the body. Prolonged exposure of the uncovered head to the rays of the sun may produce a real sunstroke: the blood vessels of the brain are dilated and overfilled with blood; even a small blood vessel may burst and produce a cerebral hemorrhage. At any rate the face is flushed, there are signs of vehement headache, giddiness, vomiting, the pulse is weak and fast, the patient may suddenly fall unconscious, as though felled by "a stroke." This is a dangerous stage.

In contrast to the local effects of the sun in a sunstroke, a heat stroke is due to the general overheating of the human body. It has been found that in factories efficiency falls with rising temperatures and in hot industries the output is higher in winter. In a tin-plate factory, production in the hottest month of the year was 10 per cent lower than in the coldest months. In an ill-ventilated factory the decline in output was found to be 30 per cent.

In hot, humid weather (sunshine may even be absent) the natural giving off of body heat is decreased, and more heat is produced within the body. This means an increase of the temperature of the body from normal 98 to 99 deg. F. to a fever temperature of 104 and 105 deg. and even higher. The effect is still stronger when the liquid lost by perspiration has not been replaced by corresponding quantities of water. This means loss of fluids from the blood. There are always chemical materials in the blood which cause no harm in the usual degree of dilution — which are poisonous, however, when the water content of the blood is too low. In the deep mines of South Africa, air temperature sometimes reaches 95 deg. F. with 98 per cent humidity, and air moving at only 20 feet a minute. Under these conditions, workers' temperatures may rise to 102 deg. because their sweat cannot evaporate and cool them.

Water and Salt Are Important

Immediate treatment for sunstroke and heatstroke is to take the patient into the shade or the coolest place available in the building, strip the clothing from the chest, and cool both trunk and head with cold water. Adequate amounts of water are important; they may be given as an enema or intravenous solution with unconscious patients. Workers, at all times, should drink as much water as they want, and preferably more. During the Simoom, the hot, dry poison wind of Arabia, whole parties of men sometimes perish together. Experts think that perhaps they lose so much water by sweating (up to two quarts an hour) in the dry air that they lose the ability to sweat and their bodies become defenseless against the heat.

Sweating takes large amounts of salt from the body; it has to be replaced. A little table salt added to the water (a level teaspoonful to a quart of water, or a 15 grain tablet with a glass of water) may be very refreshing. Many plants use dispensers of salt tablets located next to the drinking fountains. Another salting mechanism involves an electrically operated device for introducing a known amount of salt into a mixing tank.

Observations by Taylor and his co-workers on workers exposed to industrial heat exhaustion showed that rest, food (with salt) and water sufficed to restore all men so that they even could continue to work in the heat for hours. They concluded that heat exhaustion and ability to work in the heat are almost wholly dependent on the function of the heart and the blood vessels. Moderate salt intake is more important to preserve this function than to prevent heat cramps. But for both: prevention and treatment of heat exhaustion is the timely replacement of water decisively more important than that of salt.

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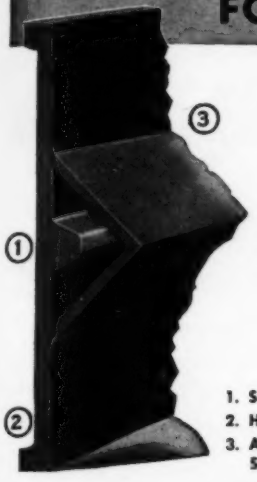

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SHOP EQUIPMENT NEWS

MORTISING ATTACHMENT

A mortising attachment of improved design has been put into production recently by South Bend Lathe. It consists of a fence assembly which bolts to the drill press worktable, a mortising chisel holder which clamps to the drill press quill, and three sizes of mortising chisels and bits: ¼, ⅜, and ½ in. For making square end mortises quickly and accurately, the mortising attachment is a real work and time saver.

Mortising Attachment

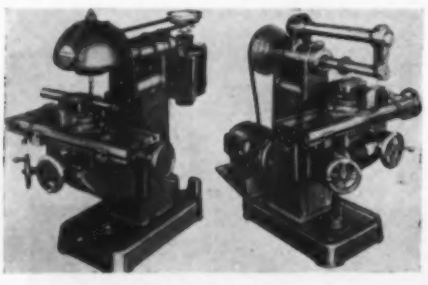
Two new features distinguish this handy drill press accessory. First, the two guide arms, which are attached to the fence, adjust separately to handle irregular shaped pieces. Second, the fence has a 1-in. independent adjustment on the base. These flexible adjustments give the attachment more capacity; up to $5\frac{11}{16}$ in. under the forked hold-down and as much as $4\frac{7}{16}$ in. between the guide arms and fence.

The South Bend Mortising Attachment fits all South Bend drill presses and can be adapted to most other makes having a 1¾-in. quill and using a ½-in. chuck. It may be purchased from any South Bend distributor or by writing directly to *South Bend Lathe, South Bend 22, Ind.*

For brief reference use IAVE—0701.

IMPROVED BENCHMASTER MILLING MACHINE

The Benchmaster Miller, which can be used interchangeably as a horizontal or a vertical mill by substituting spindle assemblies, has recently been approved by the addition of a telescopic vertical screw operated by large steel miter gears.



Horizontal Mill

The new telescopic screw permits the miller to be used on any bench or stand without drilling the table top for the screw to extend beneath. The large miter gears operating the new telescopic section assure greater smoothness and ease of operation on vertical adjustments. The Benchmaster has a 6 by 18-in. table with a longitudinal travel of 12½ in. Transverse feed is 5½ in. and vertical travel 8½ in.

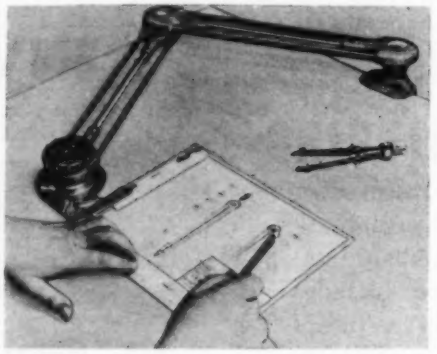
Because of its Timken Tapered Roller Spindle Bearings, with high load capacity, the Benchmaster is suitable for both low and high speed operations. Besides milling both vertically and horizontally, attachments are available for the Benchmaster for turning, grinding, and drilling operations. Circulars are available by writing *Benchmaster Manufacturing Co., 1835 West Rosecrans Ave., Gardena, Calif.*

For brief reference use IAVE—0702.

VEMCO MODEL "33" DRAFTING MACHINE

The V. & E. Manufacturing Company is introducing their new "baby," VEMCO Model "33."

This new drafting machine is a small edition of the standard VEMCO drafting machine. The arm length is 16 in. It is equipped with a vernier reading to 10 min. It has aluminum brackets and steel band covers, and a full circle base line setting and a protractor brake. Simple band tightening also is one of its features.



VEMCO Model "33" Drafting Machine

No indexing mechanism is provided and all angles, including the 15-deg. positions, are set by the protractor brake in the same manner as the angles between the 15-deg. positions of the standard drafting machine.

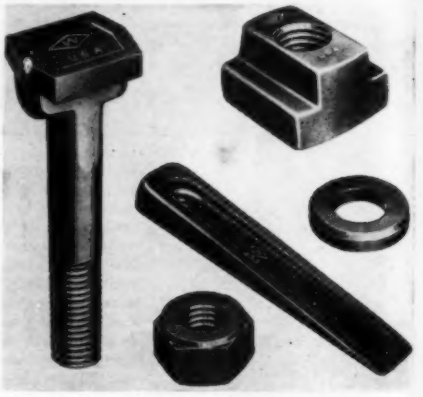
Write for the four-page, detailed descriptive circular to the *V. & E. Mfg. Co., 758 South Fair Oaks Ave., Pasadena 20, Calif.*

For brief reference use IAVE—0703.

WILLIAMS EXPANDS LINE OF SETUP ACCESSORIES

In addition to a complete line of strap clamps, J. H. Williams & Co. has added T-Slot Bolts, Nuts and Flat Washers, T-Slot Nuts and Set-Up Wedges to their line of setup accessories.

These accessories are used for setting up work on planers, shapers, milling machines, and other similar applications. All are made from a superior grade of steel to withstand severe machine-shop use. Williams T-Slot Bolts will not turn in machine table or break out machine table slots. Available in ⅜-, ½-, ⅝-, ¾-, ⅞-, and 1-in. T-Slot sizes in a wide range of lengths. Descriptive catalog pages are available by writing *J. H. Williams & Co., 400 Vulcan St., Buffalo 7, N. Y.*



New Setup Accessories

For brief reference use IAVE—0704.

NEW FULL OCTAGON HAMMER

Stanley Tools announces the new line of "100 Plus" Full Octagon Hammers. The octagon head and handle is designed to appeal to carpenters, home craftsmen, and hobbyists who prefer extra styling in a quality hammer. The new full octagon head of forged alloy steel is correctly heat-treated and tempered for hardness and toughness. Claws are finely beveled to grip shank of nail or small brad. Select straight-grained hickory handles are "evertite" processed, finished with a clear grain-revealing lacquer, and triple-wedged into the head. The Full Ostagon "100 Plus" is available with curved and ripping claw in all popular sizes.

Stanley "100 Plus" Full Octagon Hammer

For further information write to *Stanley Tools, New Britain, Conn.*

For brief reference use IAVE—0705.

NEW TOLCO SCHOOL SHOP BENCHES

The Tolerton Company is introducing a new line of Tolco School Shop Benches. The Tolco Line includes ten different models in a range of sizes covering all requirements of kindergarten, elementary, high school, and trade and vocational schools. Various styles and sizes are produced that provide work and project storage space for one, two, or four students.

The extra heavy hard maple frame is mortised and tenoned, as well as bolted, for extra strength and rigidity. Tops are laminated, edge-grained hard maple, a full 2¼ in. thick.

(Continued on next page)

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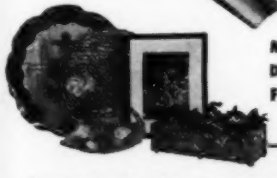

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SHOP EQUIPMENT NEWS

(Continued from previous page)

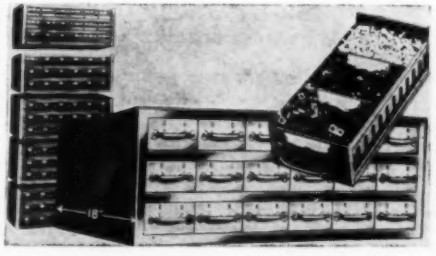
A moisture-resistant sealer is applied prior to the final coat of finish.

For further information write to *The Tolerton Co., 265 N. Freedom Ave., Alliance, Ohio.*

For brief reference use IAVE–0706.

EQUIPTO'S NEW ALL STEEL DRAWER UNIT

Equipto, Division of Aurora Equipment Company, Aurora, Ill., announces a new 18 in. deep 18 drawer steel cabinet as an addition to its established line of steel shelving, parts bins, workbenches, stock carts, and various storage units. Wider, deeper drawers and larger more easily read label holders are the new features.



New Equipto Steel Drawer Unit

Drawer size of the new unit is 5½ in. wide by 3½ in. high by 17 in. deep, size ample to hold 3 by 5-in. cards as well as nuts, bolts, screws, electrical and hardware supplies, flower bulbs, laboratory supplies, etc. Drawers come equipped with two dividers adjustable on 1 in. centers. Label holders are furnished on every drawer and divider.

The sturdy steel frames, as illustrated, stack on each other to accommodate a maximum of material in a minimum of space. Over-all size of cabinet 18 in. deep by 14 in. high by 34 in. wide. Finished in olive green baked on enamel.

For further information write to *Equipto, Division of Aurora Equipment Co., Aurora, Ill.*

For brief reference use IAVE–0707.

NEW PROTO MIDGET OPEN END WRENCH SETS

The Proto line has been enlarged by the addition of three midget open end wrench sets — Nos. 3200B, 3200D, and 3300A. The small obstruction-type and electrical-type wrenches in these sets are used for delicate adjustments on instruments, appliances, carburetors, timers, generators, radios, television sets, other electrical equipment, etc. Each set has a flexible Vinyl plastic kit to keep the wrenches separated from larger tools and to make the needed sizes readily available.

Set No. 3200B includes a 4½-in. midget plier, and four obstruction-type wrenches with eight different opening sizes — ranging from $^{13}/_{64}$ to $^{5}/_{8}$ in.

Set No. 3200D is an expanded master set that contains all the tools in No. 3200B, plus four additional wrenches. It provides eight different opening sizes in both 15- and 60-deg. head angles.

Set No. 3300A is a professional set of nine electrical-type wrenches with different opening sizes, ranging from $^{7}/_{32}$ to ½ in. Each wrench has

(Continued on next page)

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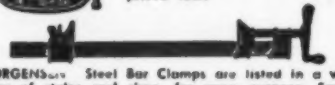

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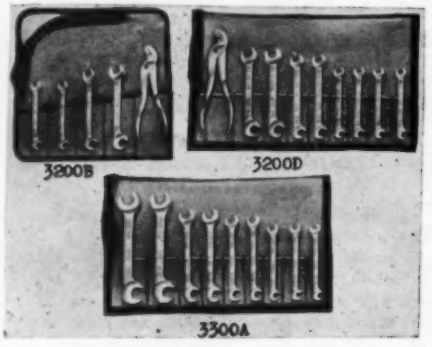
(Continued from previous page)



Proto Midget Open End Wrench Sets

the same opening on both ends, but at different head angles.

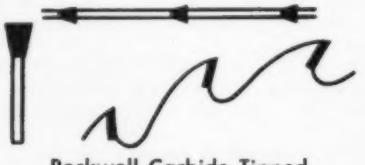
All of these midget open end wrenches have narrow shanks, compact heads, and very small fillet radii to increase their usefulness, particularly near obstructions where maximum clearance is required.

For further information write to *Plomb Tool Co., 2204 S. Santa Fe Ave., Los Angeles, 54, Calif.*

For brief reference use IAVE—0708.

ROCKWELL CARBIDE TIPPED CIRCULAR SAWS

A complete line of standard type and *on-the-job* engineered and precision fabricated tungsten carbide tipped circular saws, 6 in. to 36 in., in diameter, is announced by the Rockwell Manufacturing Company.



Rockwell Carbide Tipped Circular Saw

Rockwell carbide-tipped saw blades make all cuts faster and smoother; cut materials which are difficult or impossible to cut with a saw of ordinary steel; cut all wood, fiber boards, hard boards, laminates, plastics, and highly abrasive materials; cut nails, wire, and similar obstructions; cut joints in wood ready for gluing safely; and minimize kickbacks; and last 25 to 100 times longer before resharpening. They eliminate frequent blade changes; the loss in blade diameter after resharpening is negligible; and the cost cut for cut is far lower.

Rockwell tungsten carbide cutting tips are chisel faced, cut on both sides of the kerf, taper back from the cutting edges, and are without set. Smooth fast cutting results.

Additional information can be obtained from *Rockwell Tools, Inc., 1314 Kinnear Road, Columbus 8, Ohio.*

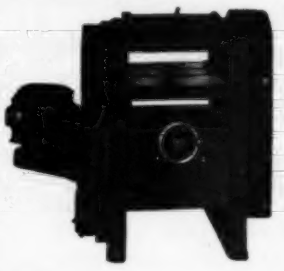
For brief reference use IAVE—0709.

EVERTITE GLUE

The Franklin Glue Company is now packaging Evertite, a clean white resin glue, in six sizes for homecraft and general household use.

(Continued on page 56A)

TOOL UP WITH WOODWORKER



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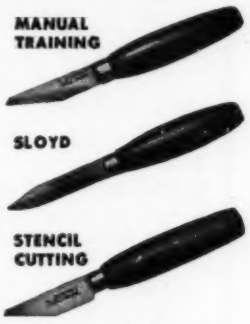

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SHOP EQUIPMENT NEWS

(Continued from page 54A)

A liquid glue, Evertite has been perfected to flow freely at temperatures as low as 60 deg. It is white, has a pleasant odor, sets quickly, and is perfectly clear when dry.

Hardware stores are now stocking this resin glue in 2-oz. bottles, ¼-pt., ½-pint, pint, quart, and gallon sizes. It is recommended for all household gluing including wood, books, pottery, linoleum, china, leather, and paper.

For further information write to *The Franklin Glue Co., 131 W. Chestnut St., Columbus 15, Ohio.*

For brief reference use IAVE—0710.

SAW TIPS BULLETIN TO BE RE-ISSUED

Saw Tips will be re-issued after having been discontinued for almost a year. This DeWalt publication will again be issued every two weeks, with the first issue appearing on July 21, 1952. *Saw Tips* will carry detailed discussions of current woodworking problems and developments.

The July 21 issue of the DeWalt bulletin discusses the cutting of heavy timbers, up to 16 by 16 in. Materials of this size are widely used in the railroad, shipbuilding, mining, and construction industries. The Dewalt firm has developed a heavy timber cutter which will angle-cut this large dimension timber at any angle up to 60 deg. This week's *Saw Tips* goes into the actual cutting and application of such cuts very thoroughly.

Saw Tips is intended to be a general information sheet in which there will be something of interest for everyone who is engaged in any phase of woodworking.

For further information, contact your local DeWalt dealer, or write direct to *DeWalt, Inc., Lancaster, Pa.*

For brief reference use IAVE—0711.

USEFUL SAFETY RULES

The Walker-Turner Division of the Kearney & Trecker Corp., recently published a set of 8½ by 11-in. Machine Safety Cards for the woodworking shops which will be found exceedingly useful.

There are nine of these cards. They contain the safety rules for those who work on the band saw, shaper, jig saw, grinder, sander, jointer, arbor saw, drill press, and lathe.

This same firm also has published a School Shop Planning Manual. The price of this manual is $1.

It contains explicit directions for planning a comprehensive general shop, gives information about architectural details, discusses the planning center and the various activity areas, presents a large template section containing scale patterns of numerous machines and pieces of shop equipment and then shows the use of these templates in a 35 x 50-ft. general metalshop layout.

Information about these safety charts and the layout manual may be obtained by writing to the *Walker-Turner Division, Kearney & Trecker Corp., Plainfield, N. J.*

For brief reference use IAVE—0712.

NEW PRESIDENT OF THE AMERICAN SCHOOL

C. M. Elliot's election to the presidency of the American School was announced by James

(Continued on page 58A)

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SHOP EQUIPMENT NEWS

(Continued from page 56A)

McKinney, new chairman of the Board of Trustees.

Dr. Edward C. Estabrooke is the new secretary of the American School.

MARTIN GEORGE APPOINTED CHIEF ENGINEER

Martin George has been appointed chief engineer of the design and development division of The Columbian Vise & Mfg. Co., Cleveland, Ohio.

In his new post, Mr. George will be in charge of all development work on both Columbian Vises and Columbian-Stevens Levels. The latter are manufactured by the company's Stevens Level Division, Newton Falls, Ohio.

CORYWELL APPOINTED PRINTING SALES PROMOTION MANAGER

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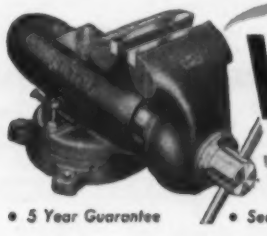

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960	961	962	963	964	965	966	967	968	969	970	971
972	973	974	975	976	977	978	979	980	981	982	983
984	985	986	987	988	989	990	991	992	993	994	995
996	997	998	999	9100	9101	9102	9103	9104	9105	9106	9107
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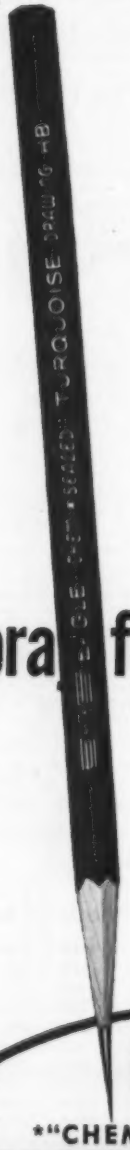

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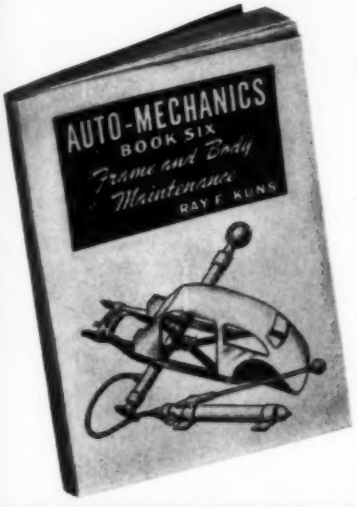

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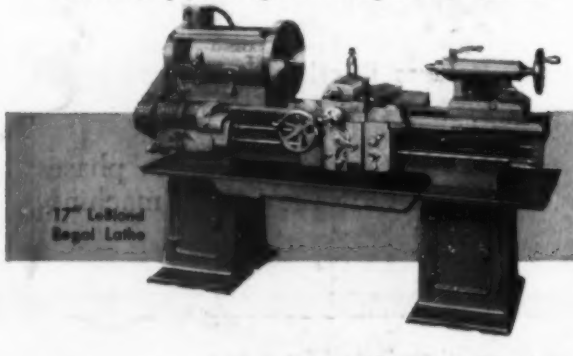

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